

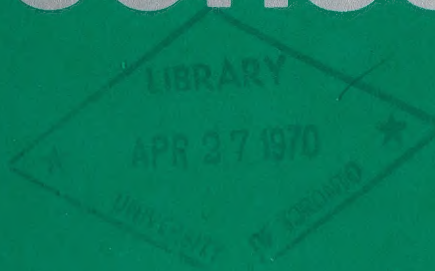
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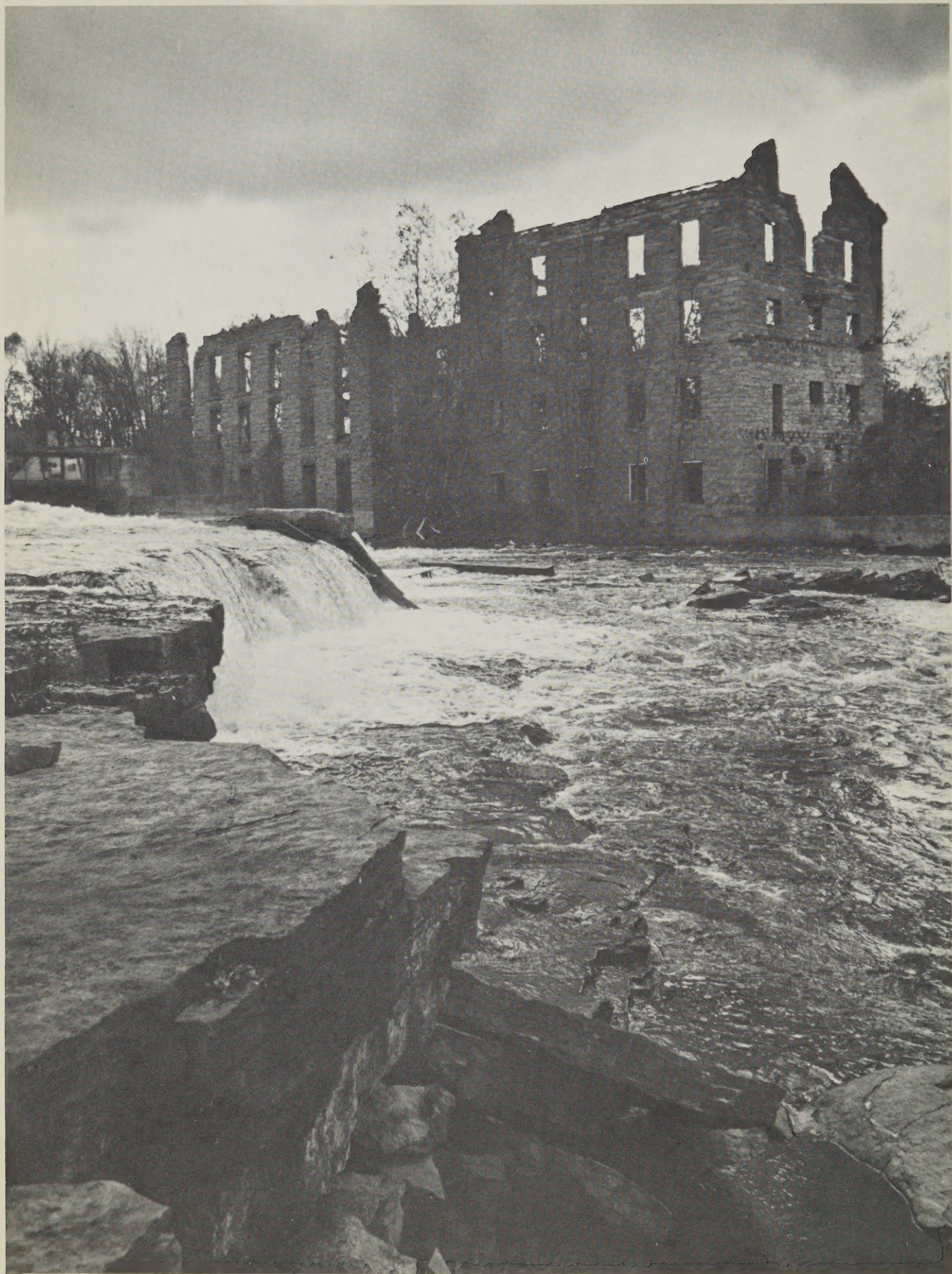




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The old mill at Appleton is a scenic attribute of the Mississippi Authority.



**Department of Energy and Resources Management**

HON. GEORGE A. KERR Q.C., Minister

J. C. THATCHER, Deputy Minister

A. S. L. BARNES, Director, Conservation Authorities Branch

**mississippi  
valley  
conservation  
report  
1970  
volume I  
report and plan**



ONTARIO





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The old mill at Appleton on the Mississippi River

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## SUMMARY AND INTRODUCTION — PART 1

### SUMMARY

The Mississippi River and the adjoining smaller streams, the Carp River and Constance Creek, empty into the Ottawa River along the northern boundary of the Regional Municipality of Ottawa-Carleton. These rivers drain an area of 1,718 square miles, characterized by relatively low assessment and population except for the urban concentration close to Ottawa. The upper part of the Mississippi watershed is on the Precambrian Shield, where rock outcrops and shallow, coarse or acid soils produce a low capability for agriculture, a fair capability for forest management and a good potential for recreation based on the sometimes rugged topography and the many attractive lakes and streams. Fish, wildlife and varied plant communities are of considerable interest to the angler, hunter and naturalist. Nearer Ottawa, on soils derived from the sedimentary rocks, the potential for more intensive agriculture increases, although here the urban competition for land also becomes a factor.

The area has a rich history of lumbering, settlement, abandonment of submarginal farms and decay of early industry, which is described in some detail in a companion volume, History. More recent history has seen a small start on reforestation of the pine forests and regrowth of cutover hardwoods to a stage where, although they are far from their potential timber production, many stands are too tall to supply adequate deer browse unless managed specifically with that purpose in mind. Agriculture on the better lands is just starting to intensify in production of cash crops and dairy products, while dairying on the poorer soils is giving way to beef production.

Water supply and quality is generally adequate, although some lakes have low summer levels, some local pollution occurs and any intensification of agriculture requiring irrigation will need improvement of water supplies. Flood damage is not widespread but does create local problems on the lower Mississippi River and the Carp River.

Erosion of stream banks is common, especially where cattle have access. Logging operations having inadequately planned roads contribute to erosion and sedimentation of streams.

The report suggests that all reservoirs be multi-purpose in nature. Diversion of water from the Mississippi River at Kashwakamak Lake to increase storage in Clarendon Lake is recommended, together with construction of low dams at Marble Lake, repair of the dam at Mazinaw Lake and erection of two other low dams: one at Joe Lake on the Clyde River and the other at Bennett Lake on the Fall River. The dams at Lanark and at Carleton Place are also reported to be in poor condition and need further study. Channel improvements on the Carp River, flood plain zoning and development of a flood warning system are further recommendations to reduce flood damage. Farm ponds are suggested for added water supply.

The principal sources of pollution are identified and the Authority advised to co-operate with the Ontario Water Resources Commission in

monitoring its streams and in educating the public to avoid practices which contribute to water pollution.

Demonstrations and education are suggested to reduce erosion through better land use by contour tillage, use of windbreaks, establishment of grass waterways, exclusion of cattle from eroding stream banks and better planning of lumbering operations. Protection of drainage tile outlets is advocated.

A total of 184,520 acres of submarginal private land is identified as suitable for public acquisition for forestry purposes. Except where a potential for multi-purpose development justifies higher prices, it is recommended that the Authority give priority to purchases in the Precambrian Shield area. Private owners should be encouraged to take advantage of the Woodlands Improvement Program to achieve better forest management on their lands. Some marginal lands may be improved by pasture renovation with Birdsfoot Trefoil.

Depth contours investigated during the survey for many of the lakes not previously mapped will aid the Authority and the Department of Lands and Forests in fish management. Depth-temperature studies are recommended for 17 lakes and stocking or other improvements for several of them.

The Authority should adopt on its own lands and recommend to others methods of hardwood thinning which increase deer browse.

Introduction of suitable aquatic plants, installation of Wood Duck nesting boxes and the blasting of certain Cattail marshes are recommended as aids to wildfowl.

Recommendations are made for careful long-range planning to produce a high quality environment for recreation and a conservation area classification and zoning plan is described. Twenty-five potential conservation areas are described briefly for the Authority's consideration; 15 scenic drives, three canoe routes and four hiking trails are outlined. Stress is laid on the need for liaison and integration of Authority recreational developments with those of other agencies to produce a co-ordinated regional recreation program.

Part 6 of the report presents a Conservation Plan designed to clarify Authority policy and provide a basis for orderly implementation of measures to ensure maximum benefits to society from the natural resources of the Mississippi Valley. Co-operation with other governmental bodies is stressed and a realistic ceiling of 0.5 mills on provincial equalized assessment is proposed for the general levy on member municipalities. More specific policies are proposed to achieve objectives in water development, fish and wildlife development, and recreational development.

Development priorities have been set forth for an initial five-year period, to be considered as part of a broader, long-range program. The priorities will be adjusted from time to time as conditions warrant and a complete review will be made after the first five-year period. Many of the programs are of a continuing nature, not necessarily costly, but requiring an early start and continued vigorous promotion. In the more specific

projects detailed in a suggested order for each of the first five years, stress is placed on early acquisition of the lands required for later development.

The Plan has been discussed with the executive committee of the Mississippi Valley Conservation Authority and approved in principle. Its implementation, however, will depend on the enthusiastic co-operation, financial and otherwise, of the participating municipalities, the members of the Authority and the private citizens of the Mississippi area.





## SUMMARY AND INTRODUCTION — PART 1

### INTRODUCTION

Following the formation of a conservation authority in the neighbouring Rideau watershed in 1966, the Almonte Citizens Planning and Housing Committee started inquiries regarding the advantages of a similar organization for the Mississippi area. A number of public meetings were held and a favourable vote of the municipalities concerned resulted in the establishment of the Mississippi Valley Conservation Authority by Order-in-Council 1802/68 dated May 2, 1968, "with jurisdiction over the watersheds of the Mississippi River and all other streams entering the Ottawa River between the point where the north-west boundary of the Township of Fitzroy meets the shore of the Ottawa River and the point where the west boundary of the Rideau Valley Conservation Authority meets the shore of the Ottawa River."

At its first meeting, the Authority passed a resolution requesting the Minister of Energy and Resources Management to undertake a study to assess the conservation problems and opportunities within the Authority area. This study was made in the summer of 1968, at no cost to the Authority, and is the basis of this report. In view of the large area concerned and the limited time available, the survey was a broad reconnaissance only. At the beginning contact was made with such sources of existing information as the Ontario Department of Agriculture and Food and Department of Lands and Forest. Field studies were designed to enlarge or fill gaps in this information. The studies covered conservation aspects of land, forest, water, wildlife, recreation and community planning. Survey crews consisted of university students in these subjects under the direction of the experienced section heads of the Conservation Authorities Branch, Department of Energy and Resources Management.

Conditions reported, are of course, those at the time of survey in 1968 and may, in some few instances, have changed even in the short time that has elapsed since the survey was completed.

The report is designed primarily for the guidance of the Mississippi Valley Conservation Authority in formulating and carrying out a program of conservation in its area of jurisdiction. The implications of the report are, however, considerably broader. It should provide additional guidance to other agents, government or private, concerned with management of resources in the valley, and to municipalities in their planning for orderly development of rural and urban areas. Above all, it is hoped that this report will promote a co-ordination of effort by all agencies to achieve a program of maximum effectiveness for the people of the Mississippi Valley.

Volume I, Conservation Report and Plan, while in itself a working document for the Authority, is of general interest to all who concern themselves with conservation in the valley. It has been printed in sufficient quantity to allow for public distribution. Volume II, Appendix, contains additional technical material, including maps and charts, of primary concern only to those responsible for making decisions on a conservation program. It is printed in limited quantity for Authority members and other persons involved. The companion volume, History, gives the background of resource

development in the area. It is of such general interest that it also has been printed for public distribution.

### Acknowledgements

Grateful acknowledgement is made of the assistance in the survey and preparation of this report received from many members of the Authority and other residents of the Mississippi watershed. Particular mention should be made of the information on the fauna and flora of the watershed supplied by Miss E. T. Ross of Pakenham.

Appreciation is expressed also for the excellent co-operation received from the staff, both local and head office, of the following agencies and government departments:

County of Lanark Assessment Office  
Mississippi River Improvement Company  
Hydro Electric Power Commission of Ontario  
Department of Agriculture and Food  
Department of Highways  
Department of Lands and Forests  
Department of Municipal Affairs, Community Planning Branch  
Department of Public Works  
Department of Treasury and Economics,  
Regional Development Branch

## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 1

#### LOCATION

The Mississippi Valley Conservation Authority, formed by Order-in-Council 1802/68 on May 2, 1968, encompasses all or parts of the following municipalities:

The Town of Almonte,  
The Townships of Bagot and Blithfield,  
The Township of Barrie,  
The Township of Bathurst,  
The Township of Beckwith,  
The Town of Carleton Place,  
The Townships of Clarendon and Miller,  
The Townships of Dalhousie and Sherbrooke North,  
The Township of Darling,  
The Townships of Denbigh, Abinger and Ashby,  
The Township of Drummond,  
The Township of Fitzroy,  
The Township of Goulbourn,  
The Township of Huntley  
The Townships of Kaladar, Anglesea and Effingham,  
The Township of Kennebec,  
The Township of Lanark,  
The Village of Lanark,  
The Township of Lavant,  
The Township of March,  
The Township of Nepean,  
The Township of Olden,  
The Township of Oso,  
The Township of Pakenham,  
The Townships of Palmerston and North and South Canonto,  
The Township of Ramsay,  
The Township of Sherbrooke South,  
The Village of Stittsville,  
The Township of Torbolton.

All of these are participating municipalities and appoint members to the Authority. The total population is 31,600.

The area under the jurisdiction of the Authority is 1,718 square miles and comprises the watersheds of the Mississippi River and smaller streams such as the Carp River and Constance Creek, which enter the Ottawa River in the southern area, near the boundary of the adjoining Rideau Valley Conservation Authority.

Of the 38 conservation authorities in Ontario, the Mississippi ranks second in area of jurisdiction, but twenty-eighth in population.







MUNICIPALITIES





## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 2

#### CLIMATE

The climate\* of an area depends on its location within the world-wide circulation of the atmosphere, but the influence of this circulation is modified by physiographic features.

Climate is the sum of past weather experiences. The conditions of temperature, moisture and light tend to be repeated seasonably since, for the most part, they are controlled by the sun, seas and land contours. The local climate also may be profoundly affected by the proximity of water and local topographic relief.

In the Mississippi watershed, where elevations range from 250 feet above mean sea level up to 1,200 feet, topography exerts a significant influence on temperature and precipitation. However, average values of these elements across the watershed show only minor variations.

Warm summers and cold winters are features of the temperature regime on the Mississippi basin. The average temperature for the year is 42°F. January, the coldest month, averages 14° and July, the warmest, 68°. The recorded temperature extremes are 40° below zero and 100° above.

The mean annual frost-free period is about 130 days. The average date of the last spring frost is May 20, while that of the first autumn frost is in the latter part of September.

The mean annual precipitation over the watershed (expressed as water equivalent), is about 32 inches, of which the average rainfall is 25 inches and the annual snowfall about 70 inches.

The average monthly precipitation ranges between two and three inches; the heavier amounts occur during the summer.

The average rainfall for the five-month growing season, from May to September, is 14 inches.

The following table<sup>+</sup> of detailed weather data from the Canada Department of Agriculture station in Ottawa is indicative of the values also prevailing on the Mississippi watershed.

---

\* Brown, D.M. et al. Climate of Southern Ontario, Meteorological Branch, Canada Department of Transport, Toronto, Canada. 1968  
U.D.C. 551582 (713)

<sup>+</sup> Temperature and Precipitation Tables for Ontario, Meteorological Branch, Canada Department of Transport, Toronto, Canada, 1967

TABLE 2-1

CLIMATE DATA — OTTAWA  
Dept. of Agriculture Observation Station

	Latitude 45	24 N	Longitude 75	43 W	Elevation 260 Ft ASL								
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean Daily Temperature (Deg. F.)	12.6	14.0	25.3	41.4	54.6	64.3	68.9	66.9	58.2	46.7	33.8	17.6	42.0
Mean Daily Maximum Temperature	21.0	23.0	33.4	50.3	65.4	75.0	79.9	78.2	68.3	55.9	40.4	24.9	51.3
Mean Daily Minimum Temperature	4.2	5.0	17.1	32.4	43.7	53.5	57.9	55.6	48.1	37.5	27.1	10.3	32.7
Maximum Temperature	54	54	78	87	95	98	101	100	102	87	74	61	102
Minimum Temperature	-35	-35	-34	- 5	21	33	38	34	24	9	-23	-38	-38
Mean Rainfall (Inches)	0.75	0.56	1.25	2.39	2.75	3.07	3.22	3.26	3.23	2.59	2.02	1.29	26.38
Mean Snowfall	16.8	17.4	14.1	3.3	T	0.0	0.0	0.0	0.0	0.5	6.8	18.3	77.2
Mean Total Precipitation	2.43	2.30	2.66	2.72	2.75	3.07	3.22	3.26	3.23	2.64	2.70	3.12	34.10
No. of Days with Measurable Rain	3	2	6	10	12	11	10	10	12	12	10	5	103
No. of Days with Measurable Snow	13	11	7	1	0	0	0	0	0	*	5	12	49
No. of Days with Meas. Precipitation	14	12	11	11	12	11	10	10	12	12	14	15	144
Maximum Precipitation in 24 Hrs.	1.16	1.78	1.90	1.90	1.76	3.05	2.82	3.56	3.67	1.99	1.44	1.39	3.67

## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 3

#### GEOLOGY AND PHYSIOGRAPHY

##### 1. Bedrock Geology

The Mississippi Authority lies within a large region which possesses a very complex geological bedrock structure. Geologists have named this complex the Grenville subprovince of the Precambrian Shield\*. This subdivision was necessary in order to differentiate between the Precambrian rocks of the southern portion and those rocks of the northern reaches of the Precambrian Shield.

The complicated structure of the Grenville rocks can be attributed to a long period of sedimentation, followed by a mountain-building period (orogeny), and finally long periods of glaciation and erosional deposition. The orogeny had the greatest effect on the bedrock structure, as small areas of sedimentary rock were uplifted and overturned. As well, regional metamorphism and the intrusion of granitic rock probably occurred during the same period of time. The agents of heat, pressure and chemically active fluids turned sandstone, shale, mixtures of sandstone and shale to quartzite, slate, schist and paragneiss<sup>+</sup>. In addition to these formations, extensive belts of crystalline limestone, which are quarried for marble building stone, were also formed.

The geological activity that followed the Precambrian formation occurred in the Paleozoic era, when periods of deposition, erosion and glaciation were prevalent. Mountain-building processes were less active and only slight lifting and settling were evident in small areas. Bedrock structure of the Paleozoic era can be found in the eastern portion of the Authority where shales, limestone and sandstone plains are the dominant features of the landscape.

A division of the Authority's area into two bedrock formations can be observed along a contact zone which generally follows the Mississippi River from its mouth at Galetta to a point in the vicinity of Bells Corners in Bathurst Township. At this point the Paleozoic bedrock is obscured by an over-mantle of glacial drift and a projection of the Frontenac Axis from the south-west which is an extension of the Precambrian rock from the north.

Separate from the contact zone area and lying east of the Carp River is an outlier of Precambrian rock surrounded by Paleozoic bedrock. This outlier is highly weather-resistant and was probably uplifted by faulting action along the Hazeldean Fault. Due to the complexity of the bedrock and

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\* Hewitt, D. F. The Grenville Problem, Special Publications No. 1, The Royal Society of Canada; Edited by James F. Thomson; University of Toronto Press 1956.

<sup>+</sup> Moore, E. S. Elementary Geology for Canada, 4th Edition, Published by J. M. Dent & Sons Ltd., Toronto, p.247.



the integration along the contact zone of the two bedrock formations, a controversy has arisen, and consequently the geologic details of areas along the Mississippi River from north Drummond Township to the mouth of the river have not been resolved.

The formation of bedrock geology under the Mississippi Authority area, therefore, is the result of a sequence of active and non-active geological events. The Precambrian events played the dominant role in structuring the bedrock. Long periods of erosion and glaciation, in addition to faulting in certain areas, have had a marked effect on the landscape of the area.

## 2. Topography

The structure and composition of the underlying bedrock can influence the physiography of a particular region. The irregular topography of the western segment of the Mississippi Authority area can be attributed to these two factors.

During the orogeneus activity in the Grenville subprovince, the folding and overturning of the sedimentary rock tended to create ridges, generally striking to the north-east. These north-easterly oriented ridges are composed of rocks which are more resistant to weathering; the soft rocks of the lower elevations eroded to form steep irregular slopes. In addition, the belts of crystalline limestone were susceptible to glacial gouging and the deeper trenches eventually formed lakes oriented to the north-east.

Another topographical feature found in various regions is traced to faulting activity in which the structured bedrock has been physically dislocated. Results of this form of movement can appear either as uplifted or settled beds of rock. Several faults have occurred in the Mississippi Authority area, creating topographical contrast with neighbouring rocks.

The Fernleigh-Clyde Fault, a major fault, striking north-easterly from Mazinaw Lake to White Lake in Bagot Township, has created a divisional line between the highly metamorphosed rock to the north and the less metamorphosed rock in the Dalhousie-Kaladar trough to the south. The less metamorphosed rocks, e.g. limestone and pyroxenes, are less resistant to weathering and hence vulnerable to glacial gouging.

The Plevna Fault, striking in a north-westerly direction from Cross Lake to Shaw Lake in Miller Township, created a narrow trench which, in certain portions, facilitated the development of watercourses.

Two locations displaying obvious faulting action in the Paleozoic bedrock are located in the eastern portion of the Authority. Major faulting is evident immediately east of the Carp River, in Huntley Township, where a segment of Precambrian rock was uplifted and exposed at the surface. Paleozoic sandstone and Pleistocene glacial deposits are the neighbouring materials of the elevated Precambrian rock which forms the eastern flank of the Carp Valley. Another fault striking in a north-westerly direction has restricted the width and depth of the Mississippi River at Pakenham.

Glacial deposition contributed to topographical formations in certain areas of the Authority. In Huntley Township, immediately west of the Hazeldean Fault, the presence of alluvial and glacial deposits are due to the outwashes of glacial streams or possibly remnants of beaches that may have been formed by the Champlain Sea. The relatively flat topography of the eastern portion of the Authority is due primarily to the long periods of erosion, approximately 250,000,000 years, on the Paleozoic bedrocks of limestone and sandstone\*.

In the western portion of the Authority, numerous kames located in the southern portions of Dalhousie and Lanark Township consist of stratified drift material. The high content of limestone particles in the till material is derived from the greatly eroded belts of crystalline limestone located just north of the glacial deposits.

A prominent feature in the landscape can be found just south of McDonalds Corners in Dalhousie Township, in the form of an esker. This ridge of glacial deposit is approximately one and one-quarter miles long and 50 feet high and strikes in a north-westerly direction almost parallel to Lanark County Road No. 12. Both the kames and the esker were formed primarily by outwash deposits of glacial streams that originated to the north.

The physiography of the Authority's area displays three distinct features: first, the rough erratic terrain is due to the variability of resistance to weathering by the complex and interlaced rocks in the Precambrian area; secondly, the relatively flat areas where the Paleozoic bedrock was subjected to lengthy periods of erosion; and finally, the undulating topographical features that occurred as the result of glacial deposition from erosive activity.

### 3. Soil Geology

Parent bedrock material and the physiography of an area have been found to have definite relationships with the soil cover types that may be found within that specific area. The rough and steeply sloped terrain in the western segment of the Authority generally has a shallow soil cover with an abundance of barren rock visible. The granitic bedrock is quite resistant to weathering, hence soil formation is very slow. Furthermore, much of the terrain is quite steep and any soil formed is usually transported rather quickly to lower elevations by erosion. The stone-sand type of soil found in northern Dalhousie Township is due to the abundant presence of coarse-grained granitic bedrock in that area of the township. Soils derived from granitic rock incline to be acidic in nature due to the high silica content of the rock. Furthermore, these coarse soils are generally more acidic because of the leaching action by water filtration.

The finer textured soils derived from limestone and shale deposits of Paleozoic bedrock tend to be basic in nature and are less susceptible to

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\* Chapman, L. J. & Putnam, D.F. The Physiography of Southern Ontario, 2nd Edition, University of Toronto Press 1966, p. 10.



leaching. Glacial abrasions on limestone deposits produce a fine powdery material that is easily transported by glacial water to low-lying areas. Settlement of silt-sized particles in these areas eventually establishes deep silty loams, while shale and slate deposits generally contribute to the formation of heavy clay soils\*. The heavy clay and clay-loam soils found in the Carp Valley, in Huntley and Fitzroy Townships, are derivatives of Paleozoic parent material.

#### 4. Minerals

No significant iron mineral deposits of economic value are worked at this time within the Authority. However, for very short periods at the turn of the century, hematite and magnetite were mined. The majority of these operations were located near the Kingston-Pembroke Railway, with the intent of shipping the ore to a smelter in Kingston+. An old lead mine, the Kingdon Mine, located on Morris Island at the mouth of the Mississippi River, ceased operations in the late 1920s.

At the present time, non-ferrous mining in the form of marble quarrying and gravel pit operations are carried out within the Authority's area. The marble quarries, however, number only three, of which two cut dimension stone for building purposes, and the third produces rubble limestone for kiln reduction of limestone. The latter quarry is quite small and is located just west of Carleton Place. The other two larger quarries are situated in the crystalline limestone belt in Darling Township.

Gravel burrow pits are located in the kames just south of Dalhousie Lake and east of the village of Lanark, while other commercial pits are located in several spots in Huntley and Fitzroy Townships.

#### 5. Natural Features

Striking natural features within the Authority are not numerous. The most prominent feature on the western perimeter of the Authority is the granitic bluffs, commonly called the Mazinaw Bluffs, which are due to faulting of the bedrock. The strike of the bluffs is north-easterly and parallels Mazinaw Lake which also is a consequence of the fault. The height of the bluffs, about 1,100 feet above sea level, cannot be utilized as a vantage point at the present time due to inaccessibility.

Another natural feature is the limestone-dolomite plains just east of Almonte and locally called the Ottawa Burnt Lands. Further east, the low valley along Constance Creek provides an interesting aspect as this valley floor is only 25 feet above the present water level of the Ottawa River.

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\* Borger, K. C., *Introductory Soils*, the McMillan Company, New York, 1965; p. 100.

+ Ingall, E. D., *Report on the Iron Deposits Along the Kingston and Pembroke Railway in Eastern Ontario*, Geological Survey of Canada Annual Report, Vol. XII, Part 1; Kings Printer 1901; p. 6.



Hence a rise of 30 feet of water in the Ottawa River could possibly alter the present course of the river to its former course.

In concluding this section on geology and physiography, it is quite apparent that the various geological activities and their duration had considerable effect on the composition and structure of the bedrock and hence influenced the physiography of the area within the Mississippi Authority.



Marble quarrying operation located in Darling Township.



## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 4

#### LAND RESOURCES

##### 1. Supply and Geographic Distribution of Soils

The rolling topography and the underlying acidic Precambrian rock give rise to soils belonging to the Great Soils Group of Podzol Soils. On the other hand, the limestone plains and the lacustrine deposits with their calcareous parent material have created Grey-Wooded and Humic-Gleysol soils. The Brown Forest soils are found in glacial tills of calcareous parent material. These four Great Soils Groups are the most prominent soils found within the Authority's area. Other Great Soils Groups are evident, but to a lesser extent.

The marked effect of glaciation and two resultant complex rock soil combinations make up the largest percentage of the Authority's soils on the Precambrian Shield portion. The Tweed sandy loam-rock complex and the Monteagle sandy loam-rock complex, which we find in the western part, together account for 67 per cent of the Authority's total land area. Both of these soils are of glacial till origin, whereas in the Authority's eastern segment, the lacustrine deposits have established clay-loams in the lower stream and valley trenches.

There is considerable variation in the soil make-up. In fact, there are 47 soil series, each displaying characteristics of its parent material. In essence, the soils are derivatives of glacial till, glacio-fluvial outwashes or of lacustrine deposition. Due to the many variations, only ten of the more prominent series and their respective locations will be described here in detail. The complete list of soil series found within the Authority are listed in Table No. 4-1.

##### a. Soil Series

###### i. Tweed Series

The irregular, moderately sloping topography of the Tweed Series is due to the underlying limestone and granitic bedrock. This parent material has contributed to the rather shallow soil complex known as the Tweed sandy loam-rock complex and covers a larger percentage of the Authority's area than any other soil series. This complex tends to display an excessive stoniness, droughtiness and low fertility rates and hence has been limited in the use of field crop production. The landscape of this soil complex primarily serves as pasture in the open areas.

The major extent of this Class 7\* agricultural land is located in the western segment of the Authority and accounts for 35 per cent (or a total of 306,232 acres) of the area within the Authority.

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\* See sub-section 2 for soil capability classes.



ii. Monteagle Series

The parent material of granitic rock with its acidic nature and the lack of lime has created a non-calcareous type of soil. Combined with the rough topography, the coarse textured material, the high rate of water percolation and the low fertility, the soil is not suited for field crop cultivation. Grazing capacity is limited on this Class 7 land and therefore the 277,983 acres should be considered for alternative purposes. This complex soil accounts for 32 per cent of the Authority's total land area. These two soils have the lowest rating, i.e., Class 7 land for agricultural purposes.

iii. Farmington Series

Soils of this series are shallow and display a rather flat topography due to the underlying limestone or sandstone plains. The shallowness, surface stoniness, low productive capacity and the lack of adequate soil moisture in the summer months create a soil with little ability to support field crop cultivation, although low capacity pasture is an alternative. These soils make up a Class 6 land and account for seven per cent of the Authority's total area. An example of this soil series can be found in the Ottawa Burnt Lands, east of Almonte.

iv. Tennyson Series

The more productive soils of the Tennyson Series can be found along the eastern fringe of the Precambrian Shield where the glacial till has contributed to the gentle sloping topography. In some locations where stoniness is not too excessive, the well-drained soils, when combined with adequate cultivation practices, can produce suitable crop yields. The soil-rock complex of this series has a low production capacity and therefore the soils in this situation will only support grazing. The total acreage for the Tennyson Series amounts to 19,630 acres or two per cent of the Authority's total land area.

v. Carp Clay Loam

The Carp clay loam can be found in the eastern segment of the Authority, along the Carp River. The topography of this Class 1 land is gently undulating and the heavy soil is generally slow to drain. The fertility of this lacustrine soil is considered to be medium to high and thus it can support good crop yields if good cultivation practices are carried out. The total area is 17,509 acres and accounts for two per cent of the total land area.

vi. Rideau Clay Series

An extensive area of 22,164 acres of Rideau Clay can be found north of Pakenham, where the topography is very gently sloping. Due to its imperfect drainage, the periods for working the soil are limited in order not to destroy the soil

structure during tilling operations. The soil is susceptible to gullyng. However, with good soil cultivation practices a high rate of production can be achieved. This series accounts for two and one-half per cent of the Authority's total land area, or 22,164 acres of Class 3 land.

vii. White Lake Series

The sand-gravel deposits are due to glacial outwashes forming small scattered areas with rather steep slopes in the Precambrian Shield area of the Authority. The coarse texture of the poorly sorted gravel increases the permeability of the soil and the soils are rather dry. The steep slopes and low fertility tend to establish these areas more for grazing purposes than for crop production. The soil-rock complex of this series is of little value for agricultural pursuits. Furthermore, if these soils are exposed, their erosion susceptibility is quite high. The 18,220 acres (Class 6) accounts for two per cent of the Authority's total land area.

viii. Almonte Series

The Almonte silty clay loam is of lacustrine origin and quite productive for cereal grains, hay and pasture. However, proper soil management is necessary to preserve the soil's structure. In addition, the soil is susceptible to sheet erosion and will require some attention due to the gently rolling topography. The soil is considered to be well drained, although the internal water movement in the soil is moderate. The total acreage is 8,300 acres (or one per cent of the Authority's total land area), and skirts along the Mississippi River, just north of the town of Almonte.

ix. Wendigo Series

The sandy loam soils of this series are the result of glacial outwash and form small pockets of shallow ungraded gravels and sand. The fertility of these soils found in the Precambrian Shield area is not suitable for agricultural purposes, and they are classed as Class 5 soils. The acreage is 4,090 acres, thus forming less than one-half per cent of the Authority's total land area.

x. North Gower Series

The calcareous clay loam soils of this series are located on relatively flat or depressional topography. Due to their lower elevations the areas tend to accumulate runoff water. Consequently these soils have a high water-table. The soils are mainly used for pasture, but field crop production can be carried out on these soils if drainage systems and sound cultivation methods are implemented. The acreage totals 12,175 acres, is Class 2 land and forms only one per cent of the Authority's total land area.

TABLE 4-1

SUMMARY OF THE MAJOR SOIL CLASSIFICATIONS IN  
THE MISSISSIPPI REGION CONSERVATION AUTHORITY

Origin of Parent Material	Soil Series	Type	Total Acreage (acres)
Glacial Till	Tweed	sandy loam	330
	* Tweed	sandy loam-rock	305,899
	Monteagle	sandy loam	11,771
	* Monteagle	sandy loam-rock	266,212
	* Tennyson	sandy loam	16,340
	Tennyson	sandy loam-rock	3,290
	* Farmington	undifferentiated	36,196
	Farmington	loam	14,020
	Farmington	clay loam	14,020
	Farmington	shingly loam	3,264
	Farmington	sandy loam	3,158
	Grenville	loam - shallow phase	156
	Grenville	loam	273
	Grenville	loam - boulder phase	156
	Galesburgh	sandy loam	1,248
	Balderson	sandy loam-rock	390
	Balderson	sandy loam	390
	Anstruther	sand	14,152
	Innisville	sandy loam	180
	Wemyss	sandy loam	140
	Chandos	sand	3,509
	Lyons	loam	819
	Eastport	sand	1,210
	Nepean	sand	4,055
Glacio-fluvial Outwash	White Lake	sandy loam	11,300
	* White Lake	sandy loam-rock	6,970
	Kars	gravelly sandy loam	4,328
	* Wendigo	loamy sand	4,090
	Uplands	sandy loam	3,567
	Rubicon	sandy loam	3,513
	Monotick	sandy loam	1,130
	St. Peter's	gravelly sandy loam	2,150
	Mountain	sandy loam	230
	Bolingbroke	sandy loam	1,690
	Wayside	sandy loam	30
Lacustrine	Carp	clay loam	
	* Rideau	clay	16,474
	Rideau	clay-rock	5,690
	* Almonte	silt loam	8,300
	Snedden	silt loam	5,330
	* North Gower	clay loam	12,175
	Osgoode	loam	3,241
	Renfrew	clay	1,521
	Appleton	silt loam	600
Organic	* Muck		61,275
	Rockland		4,160

\* Brief description given in the text for the selected soil series.



xi. Muck

Scattered throughout the Authority, organic deposits can be found in low wet spots or skirting the meandering streams and rivers. The more extensive areas are found in the eastern segment of the Authority and at present are not utilized for agricultural production to any extent, as development costs would be too high.

2. Land Resource Areas and Soil Suitability

a. Agricultural Capability

The soil capability system recognizes seven classes with the first four classes (Classes 1, 2, 3 and 4) indicating the suitability of better arable lands for field crop cultivation. The suitability decreases as the number increases, as a result the Class 4 group delineates the marginal lands for crop production; and the Class 1 soils are considered to have no significant limitations for agricultural production\*.

Class 1: Soils in this class have no significant limitations that restrict their use for field crops.

Class 1 soils are found on deep, moderately drained soils on relatively flat rolling slopes. Moisture retention of the soil must be good and the regular application of fertilizer is necessary to maintain the fertility of the soil. Cereal grains, corn and hay can be successfully grown in the Mississippi Valley Authority region on Class 1 soils such as the Almonte silt loam that skirts the Mississippi River in Ramsay and Pakenham Townships.

Class 2: Soils in this class have moderate limitations that reduce the choice of crops or require moderate conservation practices.

The soils in this class are generally considered to be deep, with a gentle rolling topography. However, some limitations may be imposed due to lower fertility potentials or excessive water retention. This high water content can restrict working periods on the soils or alter the structure of the soil. The crop yields are medium, but, by means of good cultivation measures and drainage programs, the capacity of the soils can be increased.

Class 3: Soils of this class have severe limitations that reduce the choice of crops or require special conservation practices.

Soils of this group generally display gentle rolling to undulating forms of topography with a number of limitations which affect the rating of the soil. Heavy and slowly drained soils such as the Rideau

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\* Hoffman, D.W., and Miller, M.H. The Soils of Lanark County, Ontario, Report No. 40 of The Ontario Soil Survey, 1967; p. 52.

Clay are examples of the Class 3 land. Care must be exercised to improve the fertility of the soil and the structure of the soil. Stoniness and the shallow soil cover over the bedrock also have a limiting effect on root growth.

Class 4: Soils in this class have severe limitations that restrict the choice of crops and require very special conservation practices or very careful management. This class of land can be considered as the terminal point in considering land for economic agricultural production. Some soils, if given intensive attention, may provide a reasonable crop yield. However, much of this land may be better used for forestry purposes. Soils in this group are generally coarse-textured and consequently the permeability of the soil is high. In addition to the lower water capacity, low fertility of the soils, stoniness and the shallow depth to bedrock of these lands greatly hinder the field crop production.

Class 5, 6 and 7: Soils of these three groups are not suited for cultivation, due mainly to degrees of stoniness or shallow depths of soil to bedrock. Some Class 5 and 6 land could be used for grazing purposes, while Class 7 land is not suited for agricultural production and, in fact, should be diverted to other uses such as forestry, wildlife or recreational uses. It is interesting to note that 67 per cent of the Authority's total land area falls within Class 7 land and, therefore, the continued use of these lands for agricultural pursuits in the Precambrian Shield is questionable.

b. Forest Capability

Soils have also been grouped into seven classes with reference to their ability to grow commercial timber. Class 1 displays little or no limitations to the growth of commercial forests\*. The productivity of a soil class is considered on the basis of mean annual increment of the best species adaptable to the site. Productivity classes are expressed in gross merchantable cubic foot volume to a minimum diameter of four inches, with the minimum quantity set at slightly more than 50 cubic feet per acre per year. This figure is based upon fully stocked stands. Class 2 to Class 4 meet these requirements although the Class 4 lands just reach the cut-off point. Hence the Class 4 lands could be considered as the basic level for forestry operations to be economical.

The remaining three classes, i.e. 5, 6 and 7, have decreasing productivity levels, mainly due to the shallow soil depths, low moisture retention, the subjection to active erosional forces, or poorly drained organic soils.

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\* McCormack, R. J. Guidelines for Mapping — Land Capability for Forestry Program; Dept. of Forestry and Rural Development, Ottawa 1968; p. 8.

The boundaries of the various agricultural land capabilities reveal a close relationship with the boundaries of the numerous soil types. On the other hand, the forest capability classes do not adhere to the soil type delineations as determined by previous soil surveys. This is due to the larger units of forest capability classes which tend to disregard small isolated areas that display a different soil type from the major surrounding soil types. The agricultural capability maps take these small areas into account when determining the class boundaries.

The forest capability classes in the eastern segment of the Authority generally adhere to the designated soil type areas, however. This is primarily due to the restrictions placed by the physiographic features such as the limestone plains and the Precambrian rock outcrops. The forest capability Classes 2 and 3 are located on the lacustrine soils, with Class 5 on the Ottawa Burnt Lands and Classes 6 and 7 on the Precambrian rock outcrop east of the Carp River. Extensive areas of Class 3 and 4 capabilities lie within the Precambrian Shield portion of the Authority. These designations coincide with the expansive soil-rock complexes which account for 67 per cent of the Authority's area, as previously mentioned. The agricultural capability rating on these complex soils is Class 7, signifying that much of these lands should be used for purposes other than agricultural cultivation. This extremely low capability rating on the Tweed and Monteagle Soil Series is a reflection, to a great degree, of the existing situation of low productive farm operations on the Precambrian Shield.

Table No. 4-2 lists total acreages of land capability classes and the appendix contains a map, Figure 4-A1 indicating locations of these various classes.

### 3. Natural Vegetation

J. S. Rowe's Forest Regions of Canada places the Mississippi Valley Conservation Authority in two sections of the Great Lakes: St. Lawrence Forest Region, the Middle Ottawa Section; and a small portion of the Upper St. Lawrence Section.

The Middle Ottawa Section includes the typical hard-rock upland of much of the Authority area, which supports an upland forest of sugar maple, beech, yellow birch, red maple and hemlock. These are almost always accompanied by white and red pine, which also characterize dry ridges and sand flats in association with jack pine. Varying amounts of white spruce, balsam fir, aspen, white birch, red oak and basswood are present throughout. Rather common are hardwood and mixedwood swamps in which white cedar, tamarack, black spruce, red maple and white elm appear. A number of more southerly species that are not characteristic but scattered here and there are butternut, bur oak, white ash and black cherry.

A similar group of forest species is found in the Upper St. Lawrence Section. They are accompanied by more common occurrences of white elm, basswood, white ash, largetooth aspen, and red and bur oak. Although this



TABLE 4-2

CAPABILITIES FOR AGRICULTURAL AND TIMBER USE  
(by percentage of portion of township within the Authority)

Township	Agricultural Capability				Forest Capability			
	Classes (%)				Classes (%)			
	1 - 4	5	6	7	1 - 4	5	6	7
Blithfield	-	-	-	99.9	42.3	57.6	-	-
Barrie	-	4.9	-	95.0	90.1	-	9.8	-
Bathurst	16.6	0.9	3.9	78.5	44.9	55.0	-	-
Beckwith	47.4	0.9	40.6	11.0	67.0	32.9	-	-
Clarendon	0.1	-	1.4	98.4	68.3	1.0	30.6	-
Miller	-	1.4	3.4	95.1	51.6	48.3	-	-
Dalhousie	4.1	-	3.8	92.0	98.9	1.0	-	-
N. Sherbrooke	0.4	-	6.0	93.5	88.9	11.0	-	-
Darling	1.1	-	5.3	93.5	85.3	-	14.6	-
Denbigh	-	-	-	99.9	77.2	19.2	-	3.5
Abinger	-	-	-	99.9	88.7	-	-	11.2
Ashby	-	-	-	99.9	99.9	-	-	-
Drummond	67.8	1.5	16.7	13.9	38.8	61.1	-	-
Fitzroy	54.9	16.1	12.8	16.1	69.1	22.2	8.0	0.7
Goulbourn	47.8	-	52.1	-	57.8	42.1	-	-
Huntley	27.2	5.2	57.9	9.6	51.2	41.1	-	7.7
Kaladar	-	-	-	99.9	99.9	-	-	-
Anglesea	-	-	-	99.9	99.9	-	-	-
Effingham	-	-	-	99.9	89.7	-	-	10.2
Kennebec	-	3.9	-	96.0	49.7	-	50.2	-
Lanark	15.6	0.6	3.6	80.1	96.5	3.4	-	-
Lavant	1.7	0.7	3.7	93.8	66.6	33.3	-	-
March	43.2	2.5	35.7	18.5	83.4	6.7	2.8	7.1
Nepean	55.8	-	44.1	-	73.8	26.1	-	-
Olden	-	-	1.8	98.1	27.0	62.9	10.0	-
Oso	-	-	1.6	98.3	31.4	68.5	-	-
Pakenham	25.8	0.6	7.3	66.2	29.8	34.3	35.8	-
Palmerston	-	-	1.6	98.3	53.0	46.9	-	-
N. Canonto	-	-	-	99.9	-	99.9	-	-
S. Canonto	-	-	-	99.9	37.0	62.9	-	-
Ramsay	37.6	1.2	22.5	38.6	77.0	23.0	-	-
S. Sherbrooke	0.8	0.2	0.5	98.4	87.3	12.6	-	-
Torbolton	47.6	16.2	30.4	5.7	44.5	38.1	17.4	-

latter forest is characteristically broad-leaved, there is usually a representation of hemlock, white pine, white spruce and balsam fir. Wet sites may bear black spruce and white cedar. The cedar is also found on dry rocky sites. After fires, large tooth aspen, white birch, balsam fir and white spruce play a prominent role in the pioneer forest stands.

G. A. Hills' A Ready Reference to the Description of the Land of Ontario and Its Productivity, places the western and central parts of the Authority in the Bancroft Site District of the Georgian Bay Site Region. The regional vegetation is described as a forest of hard maple, yellow birch, hemlock and white pine on fresh sites generally. White spruce and balsam fir occur on fresh clays and in cooler valleys. These are mixed with hardwoods on higher altitudes. Black spruce and tamarack occur in cold wet areas.

The eastern agricultural portion of the Authority is placed in the eastern extremity of the Smith's Falls and Kemptville Site Districts of the Lakes Simcoe-Rideau Site Region by the Hills' system. The forest in these site districts is defined as beech, sugar maple, and hemlock, on normal fresh sites; oak and hickory on warmer fresh sites. Oak and ash occur on hot dry sites, sugar maple, oak and ash on normal dry sites and white pine, white elm and ash on cold dry sites. Hemlock and yellow birch or the spruces and white cedar are found on wet sites.

Modifications of descriptions of local forest cover have been made through research by Beschel, Webber and Tippet on the Frontenac Axis. The northernmost series of samples in the study covers the area of the Authority surrounding Kashwakamak and Clarendon Lakes. The frequent local variations of slope and aspect are paralleled by variations of vegetation between sites. This part of the Authority sees the following species reaching their northern limit, except for occurrences in the immediate Ottawa Valley itself:

red cedar	rock elm
trembling aspen	white oak
bitternut hickory	butternut
black cherry	blue beech

Inventories carried out in 1957 by the Department of Lands and Forests in the Tweed and Kemptville Forest Districts provide a means of showing the amount of productive forest land, bearing or capable of bearing timber of a commercial character, and non-productive forest in the Authority. Although not all of the township areas listed in these inventories are wholly within the Authority, the information concerning their forest cover is still applicable.

The original forest cover has been modified by logging, first for pine and then for hardwoods; by settlement in the area, persistent in the eastern section, but followed by abandonment of many farms in the Precambrian Shield; by fires at various intervals and by cattle grazing in areas of mixed clearing and forest. At the present time these influences persist, but a number of other factors have been added. Re-invasion of abandoned clearing and some limited reforestation tend to restore forest cover; the exploitation of cedar stands for posts, poles and boughs; the clearing of land for power lines and cottage sites and the uncertainty of

TABLE 4-3

## TREE SPECIES COMMON TO PORTIONS OF THE AUTHORITY (Hills' System)

## CENTRAL AND WESTERN SECTIONS

Hotter		Ecoclimate Normal			Colder	
Drier	Fresh	Wetter	Drier	Fresh	Drier	Fresh
Red oak	Sugar maple	White elm	White pine	Sugar maple	White spruce	Balsam fir
White pine	Red oak	Black ash	Red pine	Yellow birch	Balsam fir	Black spruce
Red pine	Beech	Red maple	Hemlock	Hemlock	White pine	White spruce
Bur oak	Hemlock	White spruce	Beech	White pine	White cedar	Tamarack
		Hemlock	White ash	White spruce	White birch	
				Balsam fir		

## EASTERN SECTION

Beech	White oak	Sugar maple	Sugar maple	Beech	Hemlock	White pine	Balsam fir
Hemlock	Red oak	Silver maple	Red maple	Sugar maple	Yellow birch	Red pine	Black spruce
Red oak	Shag bark	Red maple	White oak	Red oak	White elm	White ash	White spruce
White elm	hickory	Walnut	Red oak	Hemlock	Red elm	White elm	Tamarack
Aspen	Red elm	Black cherry	White ash		White cedar	Red elm	
Red cedar	Butternut		White elm		Balsam fir	White cedar	



TABLE 4-4			
FOREST COVER AND CROWN LAND — By Townships *			
Township	% of Township Area in Productive Forest	% of Township Area in Non-Productive Forest	% Crown Land
Barrie	86.3	3.7	
Clarendon } Miller	80.0 93.0	4.4 2.9	10-50 50+
Kennebec	30.5	37.2	50+
Denbigh } Abinger Ashby	83.7 89.8 94.4	1.8 5.1 3.4	10-50 10-50 under 10
Kaladar } Anglesea Effingham	28.7 86.3 92.1	54.6 10.0 6.5	50+ 10-50 under 10
Blithfield	92.0	2.6	10-50
Palmerston } S. Canonto N. Canonto	84.1 90.7 95.6	2.8 4.8 2.8	50+ 10-50 under 10
Olden	58.4	10.4	50+
Oso	34.7	23.3	50+
Darling	78.1	4.6	50+
Lavant	88.5	2.4	50+
Pakenham	49.3	3.0	10-50
Dalhousie } N. Sherbrooke	61.1 55.7	3.0 2.1	under 10 0
Bathurst	27.0	3.3	under 1
Beckwith	28.2	6.2	0
Drummond	26.3	6.8	0
Lanark	40.9	2.5	under 1
S. Sherbrooke	30.1	13.9	under 1
Ramsay	22.3	1.4	under 1
Fitzroy	13.5	0.6	under 1
Goulbourn	13.8	6.9	0
Huntley	16.9	5.0	under 1
March	9.6	4.4	0
Torbolton	19.3	4.6	0
Nepean	4.4	1.6	0
* Forest Resources Inventory, Department of Lands and Forests, 1957			

land use by absentee owners or rural non-farm residents, all have to be taken into account.

The distribution of present agricultural land use can essentially be divided into three regions on the basis of present farm production in association with varying soils, topography and proximity to urban centres. The section east of the Ottawa Burnt Lands is predominantly devoted to dairy farming operations. This region is a portion of the "milk shed" which services the large urban centre of Ottawa.

The centre region consists of a strip which generally lies between the Ottawa Burnt Lands to the east and the western limits created by the edge of the Precambrian Shield. In this region the livestock operations are approximately equally divided between dairy and beef raising, although recent changes show a slight shift toward beef raising. The farms in both of the previously mentioned regions are relatively well maintained, with the better farms located on the agricultural capability Class 1 and 2 areas. It should be pointed out that it is in these regions that stream-bank erosion is more prominent and in many situations grazing cattle have contributed to stream-bank erosion.

The third region of present agricultural operations lies within the Precambrian Shield area on the Class 7 lands. The farms are generally engaged in beef raising, but on a small scale. Many farmers utilize the open spaces for cattle grazing purposes. The low carrying capacity of these scattered spaces soon becomes depleted due to the extensive grazing.

On these small, sub-marginal farms the majority of the operators are of middle-age or older and are either near or in semi-retirement, and the younger members of the rural families in this region are gravitating toward non-farming employment. In the eastern segments where many of the better farms are located, there is an indication that younger male members of the farm families are taking over the management of family farms.

## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 5

#### WATER RESOURCES

##### 1. Characteristics of Drainage System

The Mississippi Valley Conservation Authority covers a large area of 1,718 square miles and the drainage system is a complex and intricate network of lakes, streams and rivers. The system resembles the Rideau in having numerous headwater lakes in the Shield and in traversing both limestone and clay plains. From its source in the rugged highlands, locally known as Eagle Hills, at elevations of close to 1,300 feet, to its confluence with the Ottawa River near the village of Kingdon Mine, its course is 125 miles in length with a total fall of 1,060 feet or about 8.5 feet per mile.

For purposes of this report, the Mississippi Valley Conservation Authority was subdivided into seven major sub-drainage basins as follows: Mississippi River — 910 square miles; Buckshot Creek — 192 square miles; Carp River — 114 square miles; Clyde River — 267 square miles; Fall River — 191 square miles; Indian River — 79 square miles and Indian Creek — 65 square miles.

Table 5-1 lists the streams showing their various characteristics.

The Mississippi River follows a general southerly course through Mackavoy, Mazinaw and Marble Lakes, then turns eastward and runs a direct west-east course to its confluence with Fall River near the village of Lanark. From this point on, it mostly follows a northerly course through Carleton Place, Almonte, Pakenham and Galetta, finally entering the Ottawa River near the village of Kingdon Mine in Fitzroy Township.

TABLE 5-1					
STREAM GRADIENTS					
River	Length	Diff. in Elev. Outlet to Origin	Max. Grad. for 1 Mile	Min. Grad. for 1 Mile	Av. Grad. for Entire River
	Mile	Feet	Feet/Mile	Feet/Mile	Feet/Mile
Buckshot Creek	24.5	299	54	0.8	12.20
Carp River	28.6	160	22.0	0.2	5.60
Clyde River	49.7	760	132.5	0.2	15.30
Fall River	43.5	354	45	0.3	8.10
Indian River	25.0	486	65	2.5	19.40
Indian Creek	15.2	286	70	6.0	13.80
Mississippi River	124.4	1,060	78	0.5	8.50



## 2. Water Yield

At the gauging station located on the Mississippi River at Appleton (drainage area 1,150 square miles), the maximum recorded runoff is 25.0 inches and the minimum recorded runoff is 5.4 inches in one year. The average yearly runoff is 13.0 inches. The minimum recorded daily flow is 100 cubic feet per second and the maximum recorded flow is 9,190 c.f.s. September appears to be the month of drought and April the usual month for floods, although about one year in five the greatest freshets come in May.

## 3. Geographic and Seasonal Distribution

The bulk of the surface water of the Mississippi Valley is concentrated in the western half of the watershed. Most of the lakes, representing about 75 per cent of the surface water area of the watershed, are found there. They cover a total surface area of 45 square miles. Of these, some of the largest are Clarendon Lake — 5,840 acres; Mazinaw Lake — 4,350 acres; Cross Lake — 4,410 acres; Sharbot Lake — 3,594 acres; and Kashwakamak Lake with 2,810 acres.

There are more than 250 other lakes and ponds within the Authority, most of which drain into the Mississippi River. The exceptions to this are Constance Lake at the extreme east end of the Authority, which drains into the Ottawa River via Constance Creek, and several small lakes having no visible outlets such as Elbow Lake in Abinger Township and Big Lake in Miller Township.

As previously mentioned, the highest average flows occur in April and the lowest flows occur during August and September. Regulation of a number of dams affects the magnitude of flows along the Mississippi River. The aim of the water management is to provide a continuous reasonable rate of discharge for power-generating purposes. As a result, the recorded peak and low flows may not be as extreme as they would have been under natural conditions.

## 4. Source of Ground Water

Records available from the OWRC for the ground-water wells put down within the Mississippi watershed show that out of the total number of 1,314 wells drilled up to 1959, 91.6 per cent of wells are recorded as drilled to bedrock and only 4.5 per cent as being in the overburden. The number of dry wells averaged 3.7 per cent.

Majority of the wells were fresh-water-bearing (90 per cent), and used for domestic purposes (85.5 per cent). Only about nine per cent of the ground water available is used for public supply. Industrial and irrigation use of ground water averaged less than one per cent.

## 5. Water Quality Factors

The Mississippi Valley is composed of large segments of managed and unmanaged forests intertwined with segments of agricultural land with



The majestic Mississippi River flowing between McDonald's Corner and Lanark.



Dam at the outlet of Clarendon Lake, looking downstream.



Rock filled timber crib dam at Mazinaw Lake, looking upstream.







Concrete dam at outlet of Canonto Lake, view looking along the crest of the dam.



Dam at Lanark on the Clyde System. View looking upstream.



Dam at Carleton Place on the Mississippi River. This was originally used for power generation by Ontario Hydro and is in need of repairs.





Pollution of the Clyde River occurs at Lanark (left) from two outhouses built directly over the river. These outhouses should be abolished and efficient septic tanks installed.

Pollution of the Clyde River (below) at Lanark from a knitting mill. An engineering study is recommended to find ways and means of solving this problem.







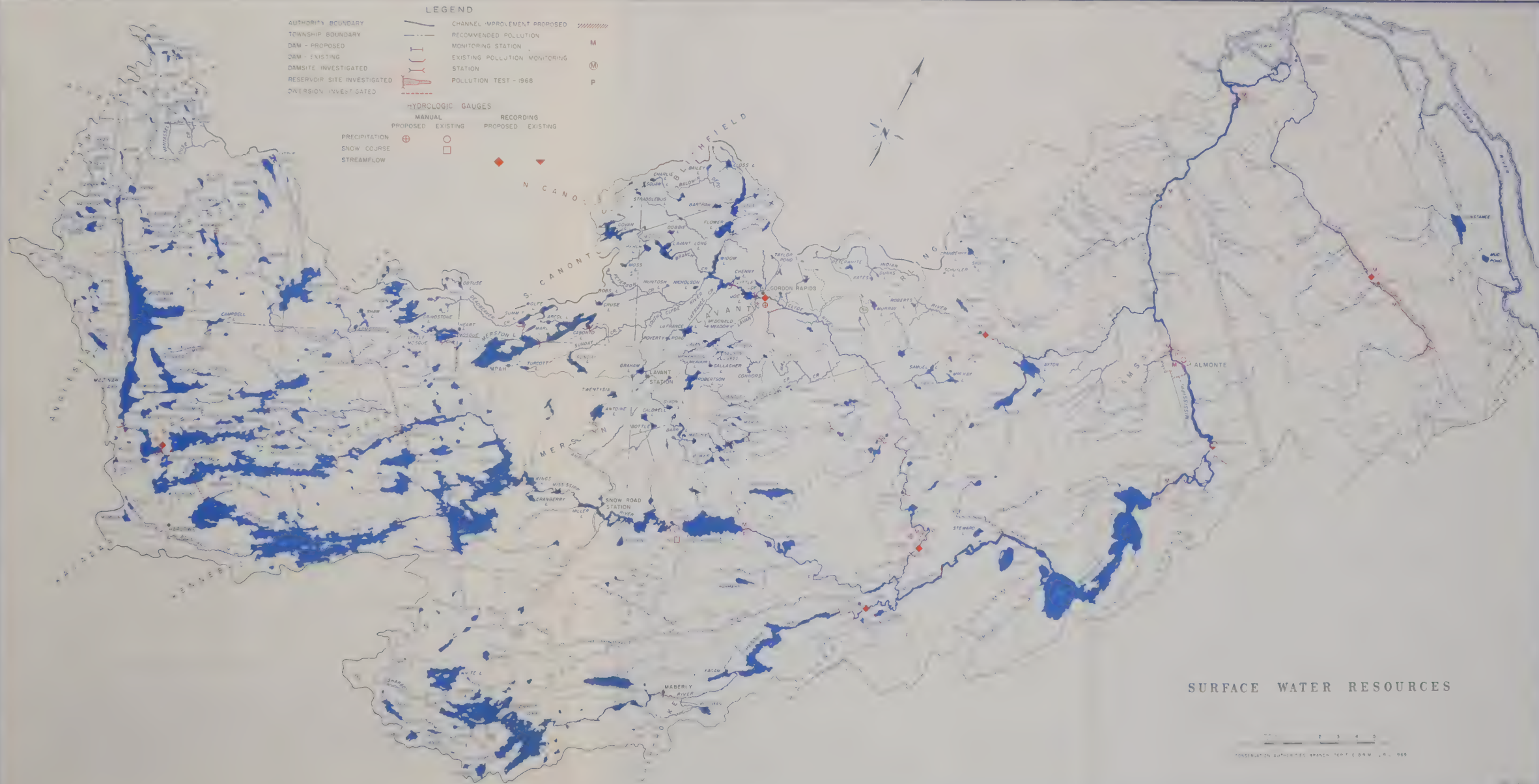
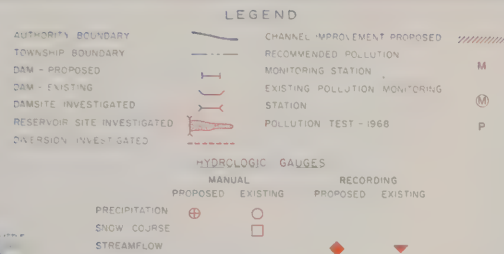


The polluted waters of the Mississippi River at Almonte with the mill which produces the effluent in the background. Below, the uncovered Oso Township refuse dump on Provincial Highway No. 7. After heavy rains the effluent from this dump finds its way into the unnamed lake in the background and thence into Sharbot Lake.









SURFACE WATER RESOURCES



relatively few urban centres, such as Carleton Place, Almonte, Lanark and Stittsville.

The water quality of the Mississippi River is generally considered to be good and relatively free of suspended soil particles. Sedimentation is not a major problem upstream from Mississippi Lake, although evidence of sediment transport to some of the lakes has been noted, namely Dalhousie Lake and Mississippi Lake.

Bennett Lake, near the village of Fallbrook, also exhibits some evidence of sedimentation deposited by the Fall River. The Ontario Hydro observed sedimentation to a lesser degree in the reservoirs at Shabomeka and Mississippi Lakes. The capacity of the reservoir just downstream from the village of Lanark is gradually being reduced by sediment carried in by the Clyde River.

The factors affecting water quality are many, but from the point of view of land use they can be gathered into two major groups, rural and urban.

a. Rural

Roads and equipment used during logging can create an erosion hazard by exposure of the forest floor. Runoff carries soil particles into adjacent streams in various quantities, representing a loss to the landscape and a detrimental contribution to streams and lakes. These are reported on more fully in Section 15.

Silting resulting from erosion by cattle trampling the banks and edges of streams was noticeable at many places such as Cody Creek, the lower reaches of Indian River, March Township along Constance Creek, and along the entire length of the Carp River.

b. Urban

Urban areas contribute mostly to the change in the chemical and biological properties of water, especially where industrial and domestic wastes enter the stream.

These conditions exist to some extent in the Clyde River near the village of Lanark and in the Mississippi River near the towns of Almonte and Carleton Place.

A more detailed description of this subject is treated elsewhere in this report.

6. Water Use and Management

The history of water use and management on the Mississippi shows that the major use has been for power development, with logging also important in the early stages. Secondary uses, such as agriculture, municipal, industrial and recreational interests have also played an important role and are becoming increasingly important as more people move into the area and the power interests move out.



The only active management programs at the moment are those of water storage for power purposes by the Mississippi River Improvement Company, and the Ontario Hydro and some lake level regulation by the Department of Lands and Forests.



Rock filled dam at Cross Lake looking along the crest. The outlet control structure is at the far end.



Dam at High Falls Generating Station. View looking upstream.







Dam at Galetta used for power generation. View looking upstream.



Concrete dam at the outlet of Palmerston Lake. View looking upstream.



## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 6

#### FISH AND WILDLIFE RESOURCES

##### 1. Fish

There is no commercial fishing of importance in the Mississippi Valley. Game fish include the following species: lake trout, brook trout, rainbow trout, northern pike, walleye, largemouth bass, and smallmouth bass.

Lake trout occur naturally in many of the deeper lakes and have been introduced into some other deep lakes where forage fish such as whitefish and cisco existed or were introduced. Brook trout are found naturally in only a few small streams, but are introduced from hatcheries into various cool lakes where they either reproduce naturally or are managed on a put-and-take basis. Rainbow trout (also known as Kamloops trout) have been introduced into many of the lakes. The introduction of muskellunge into lakes in the valley has been reported in the past but evidently was not successful. Walleye (or pickerel), which are native to the Mississippi River, have been introduced in very great numbers as eyed eggs, into many lakes. It appears from the records that many of these introductions have been successful. Both largemouth bass and smallmouth bass have been introduced into a great many lakes, but one or both of these species is native in most of the lakes in the valley.

Of the 257 lakes or ponds (apart from innumerable beaver impoundments now present) in the valley, a summary of the information available on 196 has been prepared for the use of the Authority. Most of the larger lakes and some of the smaller ones had already been surveyed in detail by the Department of Lands and Forests. These surveys have in many cases included, besides depth contours, notes on the vegetation, tests of the chemical composition and summer temperatures.

Since the mapping of depth contours is the first step in fisheries management of a lake, depth contours of 41 of the remainder were made by the Conservation Authorities Branch in 1968, after consultation with the Fish and Wildlife Supervisors at the two District offices at Tweed and Kemptville. Some of the lakes examined were found to be very shallow or relatively unimportant for fish, and maps of these lakes have not been included in this report. The contours from the field maps are available to the Conservation Authority.

Notes are available concerning lakes examined but not mapped in the report, along with additional information concerning some of the lakes for which depth contours are included in this report.

For much more detailed information concerning the past history and the present plans for the lakes in the Kemptville Forest District, the reader may refer to the excellent publication by the Kemptville District Headquarters, Report on the Mississippi Fisheries Management Unit, which is revised annually. In the Tweed Forest District the records are also kept up to date in the files, on a township basis, with annual revisions in plans.



Brief descriptions for the information of the Authority are included in Volume 2, Appendix, covering vegetation and fish found in the lakes for which contour maps are included in this report and for a number of other lakes.

**FISH STOCKING:** There have been many different introductions of fish into the waters of the Mississippi Valley in the last 30 years. The exact success of these is not now known, because many of the fish were not marked or tagged. At present it is the policy of the Department of Lands and Forests in the Tweed District to mark all hatchery fish by fin clipping before planting. By this means hatchery stock can readily be separated from wild, natural regeneration.

## 2. Wildfowl

It was quite impossible to examine in part of one summer all of the areas suitable for wildfowl in a valley covering 1,600 square miles, with innumerable beaver ponds and other areas virtually inaccessible. However, it is believed that most of the important areas, and many which proved unimportant, were examined. The major rivers and the major accessible marshes were examined. Nowhere in the valley was there a large ideal area for wildfowl such as the Dwyer Marsh just outside the boundary of the Mississippi Valley.

Volume 2, Appendix, contains descriptions of the main areas examined and particularly those with some potential for wildfowl production.

## 3. The Fauna and Flora of the Mississippi Region

The following pages include notes on the birds, mammals, amphibians and reptiles, and some of the more interesting plants found in the Mississippi Valley.

### a. Birds

The casual or serious study of birds has now become a major pursuit of a considerable segment of the population. There has been a phenomenal growth in this interest in birds, greatly increased by the publication of several efficient and very accurate field guides. With a few exceptions, birds are harmless to man's life, and many species provide benefits, such as the eating of harmful insects and weed seeds. As the population grows it seems that the percentage of people interested in birds is also increasing.

A list was made of the various species of birds seen in the valley between June 18 and September 10, 1968, by the survey party. Of the 94 species observed, four were migrants only in this area and were passing through in September on their way south, as they breed only in the arctic or sub-arctic regions. (These included the Greater Yellowlegs, the Lesser Yellowlegs, the Dunlin, and the Grey-cheeked Thrush.) These are omitted from the following list. It should be noted that the observation of birds during the survey was merely casual observation made during the course of other wildlife surveys.



Mazinaw Lake is the most spectacular lake in the Mississippi Valley. There is excellent fishing for a wide variety of game fishes. The towering Bon Echo cliff can be seen in the background of this view.



This section of the Fall River, near Provincial Highway No. 7, could be improved for waterfowl by the installation of Wood Duck nesting boxes.





A bird survey was made by J. L. Baillie (Assistant Curator of Ornithology, Royal Ontario Museum), from June 28 to July 13 in the vicinity of Buckshot Lake, in the Mississippi Valley in 1945. This survey added several species to the list. Evidence of nesting was seen for 39 of the species seen by Baillie's party, and all species seen were probably breeding birds. Godfrey\*, in his manual of the birds of Canada, includes many additional species for which the nesting range includes the Mississippi Valley. These additional species are therefore also noted in the list, which is considered a sound guide to those species which may be found in the Mississippi Valley in summer. There are, of course, several species which are winter visitors, such as the Snow Bunting, White-winged Crossbill, the Snowy Owl and others. The inclusion of birds which merely migrate through the area in spring and fall would add about 58 species to the list which here follows.

Besides the surveys of J. L. Baillie and the 1968 survey party referred to above, there are many additional records of birds and nests observed by Miss Edna G. Ross and various other ornithologists in the area surrounding Pakenham, over many years. These records (for summer birds only) are also included in the list.

The arrangement and names in the list follow those used in the American Ornithologists Union Check-List (5th edition, 1957). The birds are listed with the following prefixes:

- O. Observed by the field party between June 18 and September 10, 1968;
- N. Nests and birds observed by the field party;
- N.R. Nests and birds observed by E. G. Ross and party;
- B. Birds observed by J. L. Baillie's party in 1945; and
- G. Birds added from W. Earl Godfrey's ranges.

N.B.	Common Loon	N.B.	Hooded Merganser
G.	Pied-billed Grebe	N.B.	Common Merganser
N.B.	Great Blue Heron	N.	Red-breasted Merganser
N.R.	Green Heron	O.	Turkey Vulture
B.	Black-crowned Night Heron	G.	Goshawk
O.	Least Bittern	G.	Sharp-shinned Hawk
N.R.	American Bittern	G.	Cooper's Hawk
O.	Mallard	O.B.	Red-tailed Hawk
N.R.	Black Duck	B.	Red-shouldered Hawk
O.	Pintail	O.B.	Broad-winged Hawk
O.	Green-winged Teal	O.	Golden Eagle
O.	Blue-winged Teal	N.	Bald Eagle
G.	Shoveler	O.B.	Marsh Hawk
N.R.	Wood Duck	N.B.	Osprey
O.	Ring-necked Duck	G.	Pigeon Hawk
O.	Common Goldeneye	O.	Sparrow Hawk

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\* Godfrey, W. E., The Birds of Canada, Bulletin No. 203, National Museum of Canada, Ottawa, 1966.

N.R. Ruffed Grouse  
 N.R. Gray Partridge  
 O.B. Virginia Rail  
 G. Sora  
 G. Common Gallinule  
 O. American Coot  
 N.R. Killdeer  
 G. American Woodcock  
 G. Common Snipe  
 G. Upland Plover  
 O.B. Spotted Sandpiper  
 O.B. Herring Gull  
 O. Ring-billed Gull  
 G. Common Tern  
 O. Black Tern  
 O. Rock Dove  
 N.R. Mourning Dove  
 G. Yellow-billed Cuckoo  
 N.R. Black-billed Cuckoo  
 G. Screech Owl  
 N.R. Great Horned Owl  
 G. Hawk Owl  
 B. Barred Owl  
 G. Long-eared Owl  
 G. Short-eared Owl  
 G. Saw-whet Owl  
 N.R. Whip-poor-will  
 N.R. Common Nighthawk  
 N.R. Chimney Swift  
 N.R. Ruby-throated Hummingbird  
 N.R. Belted Kingfisher  
 N.R. Yellow-shafted Flicker  
 N.R. Pileated Woodpecker  
 G. Red-headed Woodpecker  
 N.R. Yellow-bellied Sapsucker  
 N.R. Hairy Woodpecker  
 N.R. Downy Woodpecker  
 B. Black-backed Three-toed  
     Woodpecker  
 N.B. Eastern Kingbird  
 N.R. Great Crested Flycatcher  
 N.B. Eastern Phoebe  
 B. Yellow-bellied Flycatcher  
 G. Traill's Flycatcher  
 N.R. Least Flycatcher  
 O.B. Eastern Wood Pewee  
 B. Olive-sided Flycatcher  
 O. Horned Lark  
 N.R. Tree Swallow  
 N.R. Bank Swallow  
 N.R. Rough-winged Swallow  
 N.B. Barn Swallow  
 N.R. Cliff Swallow  
 N.R. Purple Martin  
 N.R. Blue Jay

N.R. Common Crow  
 N.R. Black-capped Chickadee  
 O.B. White-breasted Nuthatch  
 B. Red-breasted Nuthatch  
 O.B. Brown Creeper  
 N.B. House Wren  
 B. Winter Wren  
 O. Long-billed Marsh Wren  
 G. Short-billed Marsh Wren  
 N.R. Catbird  
 N.R. Brown Thrasher  
 N. Robin  
 N.R. Wood Thrush  
 N.R. Hermit Thrush  
 O.B. Swainson's Thrush  
 N.R. Veery  
 N.B. Eastern Bluebird  
 B. Golden-crowned Kinglet  
 G. Ruby-crowned Kinglet  
 N.R. Cedar Waxwing  
 O. Loggerhead Shrike  
 O.B. Starling  
 B. Solitary Vireo  
 N.R. Red-eyed Vireo  
 B. Philadelphia Vireo  
 N.R. Warbling Vireo  
 B. Black-and-White Warbler  
 B. Nashville Warbler  
 B. Parula Warbler  
 N.R. Yellow Warbler  
 B. Magnolia Warbler  
 B. Black-throated Blue Warbler  
 B. Myrtle Warbler  
 N.R. Black-throated Green Warbler  
 G. Blackburnian Warbler  
 B. Chestnut-sided Warbler  
 O. Pine Warbler  
 O.B. Ovenbird  
 B. Northern Waterthrush  
 B. Mourning Warbler  
 N.R. Yellowthroat  
 B. Canada Warbler  
 N.R. American Redstart  
 O. House Sparrow  
 N.R. Bobolink  
 N.R. Eastern Meadowlark  
 B. Yellow-headed Blackbird  
 N.B. Red-winged Blackbird  
 N.R. Baltimore Oriole  
 G. Rusty Blackbird  
 N.B. Common Grackle  
 N.R. Brown-headed Cowbird  
 N.R. Scarlet Tanager  
 N.R. Rose-breasted Grosbeak

O.B. Indigo Bunting  
 O.B. Evening Grosbeak  
 B. Purple Finch  
 G. Pine Grosbeak  
 G. Pine Siskin  
 N.R. American Goldfinch  
 N.R. Red Crossbill  
 G. Rufous-sided Towhee

O.B. Savannah Sparrow  
 G. Grasshopper Sparrow  
 N.R. Vesper Sparrow  
 N.R. Slate-colored Junco  
 N.R. Chipping Sparrow  
 N.R. White-throated Sparrow  
 O.B. Swamp Sparrow  
 N.B. Song Sparrow

The most interesting occurrence is that of the Golden Eagle. Two of these birds were seen together twice during the summer. So far as is known, this pair nests outside the drainage basin. Individual Golden Eagles were seen on several other occasions.

The Spruce Grouse is omitted from the list as there appear to be no recent records of its occurrence in the area. Of new species for this area the most probable will be the Cattle Egret, an immigrant from South Africa, which has expanded its range enormously in North America in recent years. One was seen in Carleton County, just outside the area concerned in 1962\*. It will probably be first seen in this area in pasture land either in March Township or Huntley Township.

An Osprey's nest is located at the top of a tree on the largest island in Malcolm Lake (Clarendon Township).

The Ruffed Grouse (or Partridge), is the major upland game bird in the Mississippi Valley. Its populations are subject to severe declines about every ten years, after which they very gradually build up to another peak year, when they become extremely common. The habitat is woodland, preferably with scattered clearings. In 1968 Ruffed Grouse could be seen or heard virtually all over the wooded part of the valley, but the populations were certainly not at peak levels. The species can and does persist in a comparatively restricted forest or woodlot, if the essential undercover is not browsed and trampled out by cattle.

#### b. Mammals

No survey was made of the mammals, since the area of the watershed (1,600 square miles) is much too large, but a list is included in the Appendix, made from reports by the survey staff, from various other people, from records of the Department of Lands and Forests, and from the ranges shown in Peterson's Mammals of Eastern Canada. The order and names follow those of R. L. Peterson's 1966 list.

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\* Baillie, J. L. Three Bird Immigrants from the Old World, Transactions of the Royal Canadian Institute, Vol. XXXIV, Part II, 1963.



c. Deer

No special effort was undertaken to assess the population of deer in the summer survey of 1968. Such work can be done much more effectively in winter from the air, preferably with the use of a helicopter, or by the use of hunter success estimates in different areas.

The habitat for deer in the watershed depends chiefly on the wintering conditions. A good supply of preferred food close to or in a deer yard is essential.

A survey was made (by the Research Division of the Department of Lands and Forests), prior to 1967, of winter deer foods in Northern Frontenac County, which includes a large part of the western section of the Mississippi Valley\*. From this survey a tentative list of winter foods used by deer was made, classified as Preferred Foods, Standard Foods and Starvation Foods.

The most important Preferred Foods included the following:  
White cedar ..... Hemlock ..... Striped maple  
Mountain maple ... Red Osier dogwood ... Round-leaved dogwood

The most important Standard Foods included the following:  
White pine ..... White birch ..... Balsam fir  
Red oak ..... Hard maple ..... Balsam poplar  
Red maple ..... Aspen (trembling and large-toothed)

The most important Starvation Foods listed included the following species:

Black spruce ..... Alder ..... White spruce  
Elm ..... Beech ..... Willow

For some unknown reason balsam, poplar and aspens are browsed less heavily in south-eastern Ontario than in the area west of Lake Superior. These three species are used most in early spring when their buds are first swelling.

All of the species listed as preferred or standard foods occur as important components of the vegetation of the Valley with the exception of balsam poplar, which is nowhere common.

There is reported to be a large deer yard in the south-western part of Dalhousie Township. This deer yard is on privately owned land south of the Mississippi River. However, the most important deer yards in the Mississippi Valley (in the Kemptville District), are considered to be those in Lavant and Pakenham Townships.

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\* Personal communication from R. L. Hepburn, Wildlife Section, Research Branch, Department of Lands and Forests.

Deer yard improvement work, which has been chiefly confined to cutting down overmature beech and maple trees, has already been carried out on an experimental basis on 45 acres of Crown land in Dalhousie Township. The problem is compounded in Pakenham and Lavant Townships because of the mixed ownership of the land, with relatively few large tracts of Crown lands. The Department of Lands and Forests is naturally reluctant to carry out improvement on privately-owned lands, so long as crown lands remain in these Townships. However, the Department of Lands and Forests hopes to carry out additional deer yard improvement in the Kemptville District, possibly in the Mississippi Valley.

In the Tweed District, major deer yard improvement of the same kind has been concentrated in an area close to Cross Lake. In this Forest District the Department of Lands and Forests also intends to increase its deer yard improvement work, and it is likely that at least part of the work will be in the Mississippi Valley.

The take of deer in the Tweed Forest District in the 1968 hunting season was considered to be below normal, but according to the District Biologist the number of fawns in the summer appears to be about normal. Therefore, unless unusually severe winter conditions and exceptional depth of snow occur, there is no immediate danger to the deer population.

In the Kemptville Forest District, staff of the Department of Lands and Forests reported that 20 to 25 deer were taken in the Dalhousie tract in the 1967 hunting season, representing a hunting success ratio of about 44 per cent. The Department of Lands and Forests is attempting to secure additional lands which are not now crown lands in Dalhousie Township.

In Lanark County as a whole, the most recent records from the Department of Lands and Forests show that in the 1968 hunting season there were 629 hunters. These hunters carried out a total of 5,600 days of hunting, and 293 deer were taken. This represents a success ratio of 46.6 per cent, which must be considered satisfactory. The success ratio has not fallen below 40 per cent in the last three years.

Lanark County was selected because it lies almost wholly within the Mississippi Valley and provides a variety of terrain, vegetation and land use varying from forested lands to farm lands, with very little urban development.

d. Interesting Fauna

The field party observed a number of Woodchucks (ground-hogs), which were entirely black, in the area west of Almonte. It is believed that these are merely a melanistic phase of the common groundhog, and not a different race or subspecies, and that specimens of this and the normal colour can occur in the same litter.

One specimen, a roadkill, was skinned and the pelt preserved. Other observations of this unusual form had been made in 1967 close to this area, but in the Rideau Region, and it has been known to occur at Sandford, north of Toronto and in the Gaspé peninsula. This particular colour-phase is not listed in Peterson's Mammals of Eastern Canada.

e. Reptiles and Amphibians

During the 1945 survey at Buckshot Lake the following reptiles and amphibians were noted:

REPTILES: Milk snake, Garter snake, Smooth green snake, Northern water snake, Red-bellied snake, Blanding's turtle, Snapping turtle, Painted turtle.

AMPHIBIANS: Red-backed salamander, Wood frog, Leopard frog, Pickerel frog, Green frog, Tree frog, Bull frog, American toad, Spring peeper, Newt.

Other species which can be expected in the valley include the following:

REPTILES: Eastern spiny softshell turtle, Ringneck snake.

AMPHIBIANS: Mudpuppy, Blue-spotted salamander, Spotted salamander, Four-toed salamander, Two-lined salamander, Mink frog.

There is also an authentic recent record of an exceptionally interesting and attractive animal. This is the five-lined skink (Eumeces fasciatus). It belongs among the lizards, a sub-order of the class Reptilia. The observation was made at Snow Road, Palmerston Township. This species is apparently at the extreme east end of its range in Ontario in that area.

f. Ratings For Wildlife Under the Canada Land Inventory

The Mississippi Valley has already been surveyed for its wildlife potential as a part of the Canada Land Inventory, which is the basic data-gathering arm of the Agricultural Rehabilitation and Development Act (ARDA). The actual work, which is largely federally-sponsored, was carried out by the Ontario Department of Lands and Forests. The species primarily involved here included white-tailed deer, Hungarian partridge, ruffed grouse, sharp-tailed grouse, ducks and migrant geese. The land capability was based on the inherent ability of land or water to produce food and cover, but the effects of climate were also considered. The land capability rating for wildlife did not include present land use. The ratings indicate levels of game populations and production, possible only when the land or water is providing good quality habitat. By eliminating the effects of present land use, comparisons between various land uses may be made, and plans developed to put the land to its best use.





A part of Barr Lake, in Dalhousie Township, which could be much improved for waterfowl by the blasting of some of the Cattails with a cheap ammonium nitrate-fuel oil mixture.



This view shows part of Marsh No. 3 in Huntley Township. The area is already very attractive to waterfowl, and the placing of a small dam on Cody Creek would stabilize the water level and make the area even more useful for both breeding birds and those stopping over in migration.



For all of the species of wildlife, a seven-class scale was used to indicate the capability for wildlife, the areas of highest capability being rated class 1 and the lowest class 7.

The "degree of effort" required to transform an area into its best capability for wildlife was also rated in five classes, varying from class "A", where little or no habitat manipulation is needed, to class "E", where extensive and intensive manipulation would be needed to realize the full potential.

The land units mapped with particular series of symbols were normally not less than four square miles, which allows an area large enough to support self-sustaining populations of most species of wildlife, but sub-units such as marshes and bogs which could be suitable for ducks and geese were mapped of a size as small as 25 acres.

The limitations which affect productivity of any area were also mapped, as were compensations. An example of a limitation would be poor drainage which might be overcome for farmland species by good agricultural management, when the limitation would then cease to exist.

A typical example of a compensation is good interspersing of land types, providing the useful "edge effect" which most wildlife need. This is particularly notable in Dalhousie Township.

For deer production capability, most of the land on the Canadian Shield would be rated little better than Class 4, the controlling factors being the relatively unproductive soils and the lack of first class cover in winter.

On the limestone plain, north of Carleton Place, the deer production capability may be higher than Class 4, but poor drainage is in some areas a limitation.

Much of the information has already been mapped in finished form, and all of this information will shortly be transferred to the District Offices of the Department of Lands and Forests.

g. Interesting Flora of the Mississippi Valley

The flora in the Mississippi Valley on the Precambrian rocks of the Canadian Shield is in general that described for the Middle Ottawa Section of the Great Lakes - St. Lawrence Forest Region.

The present flora differs little from the former vegetation, except that the forest composition has been changed (as described in the forestry section of this report), the ground vegetation has changed accordingly, and many plants have come in, chiefly from Europe.

One of the most noticeable of these is the Ox-eye Daisy (Chrysanthemum leucanthemum), which serves to show where the remains of old haul roads still exist in the forest, and which is an almost infallible indicator of previous travel by horses. It also grows now in fields.



In the open on poor soils, two plants naturalized from Europe are particularly showy. One is Viper's Bugloss (Echium vulgare), which turns poor rock pastures almost blue in summer, particularly in limestone areas. The other striking plant naturalized from Europe is Orange Hawkweed (Hieracium aurantiacum), which is also found on poor and eroded soils and is now also coming in on cutover forest land.

There are, of course, thousands of other less spectacular plants, which are naturalized from Europe, in the Mississippi Valley.

The two plant families which almost invariably interest the naturalist are the orchids and the ferns.

#### Orchids Known to Occur in the Mississippi Valley

Cypripedium acaule .....	Pakenham
Cypripedium arietinum .....	Ramsay
Cypripedium Calceolus .....	Pakenham
Cypripedium reginae .....	Pakenham
Habenaria obtusata .....	Miller and Lavant
Habenaria clavellata .....	Lavant
Habenaria Hookeri.....	Lavant
Habenaria dilitata .....	Pakenham
Habenaria hyperborea .....	Pakenham and Sherbrooke
Habenaria macrophylla (Goldie) .....	Lavant
Habenaria psycodes .....	Pakenham
Habenaria bracteata .....	Pakenham
Epipactis helleborine .....	Pakenham
Pogonia ophioglossoides .....	Lavant and Miller
Spiranthes lacera .....	Pakenham
Spiranthes lucida .....	Pakenham
Spiranthes Romanzoffiana .....	Pakenham
Goodyera repens .....	Pakenham
Listera convallarioides .....	Miller
Listera cordata .....	Lavant
Corallorhiza maculata .....	Pakenham
Corallorhiza trifida .....	Pakenham
Corallorhiza striata .....	Lanark
Malaxis unifolia .....	Pakenham
Malaxis brachypoda .....	Miller
Calapogon pulchellus .....	Miller
Orchis spectabilis.....	Pakenham
Orchis rotundifolia var. lineata .....	Miller

(The last-named orchid was identified by O. E. Devitt near Buckshot Lake in 1959.)

The survey is indebted to Miss E. G. Ross of Pakenham for this list, which naturally tends to be concentrated in Pakenham Township and the surrounding area.

Pakenham Township and Ramsay Township are of particular interest from the botanical point of view because they contain within their boundaries many species of ferns or orchids found on the soils of the Precambrian Shield, and others found on the limestone plains. Sphagnum bogs are relatively rare in the Mississippi Valley, and many species of orchids are restricted to organic acid soils such as these.

One notable orchid missing from the above list is Arethusa (Swamp-pink) — a species of exceptional beauty which most commonly occurs in sphagnum bogs.

A list of 34 species of ferns known to be in the Mississippi Valley has also been made. This is shown in the Appendix.





## NATURAL RESOURCES OF THE AREA — PART 2

### SECTION 7

#### QUALITY OF THE NATURAL ENVIRONMENT

For many years, visitors and tourists have been availing themselves of the recreation opportunities afforded by the Mississippi River watershed. The majority of these visitors travelled from the United States, New York and Pennsylvania in particular.

They were attracted by the clean, pure water, the lack of crowding, and the excellent fishing which was available in the area.

This picture is changing rapidly. Due to a decreasing amount of land available in other areas, and the resulting soaring costs, crowded conditions, and resultant pollution and depletion of fishing stock in the area north of Toronto (i.e., Haliburton, Kawartha, and Parry Sound districts), many people from south-western Ontario are starting to look to the Mississippi River area to meet their recreation demands.

Some of this pressure is already being felt. With ease and speed of transportation increasing, more and more people are realizing that this is an ideal area in which to follow their recreational pursuits. They are also being drawn by the amount of relatively inexpensive land available to them.

In the past, development in this area has been haphazard, with very little control. Cottage subdivisions have been laid out with little or no planning, and many of the establishments such as motels and cottages or cabins are only of mediocre quality. In many instances, there is little or no control over the disposal of wastes such as sewage and garbage with the resultant danger of deterioration of the landscape and environment in some areas.

With the increased demand, pressure on the Mississippi area will increase.

There is still time to implement controls and undertake sound environmental planning to prevent further deterioration of the environment. It will be the task of the Mississippi Valley Conservation Authority to take an active part in maintaining and improving the environment through recommendations made in this report and by formulating further recommendations, as well as aiding other agencies in the implementation and enforcement of planning decisions and controls with respect to the watershed.

From the Ottawa River to its headwaters north-west of Lake Mazinaw, the Mississippi Valley Conservation Authority offers a great deal in the way of recreational potential.

The watershed can be divided into three regions, each with its own physical characteristics, recreation opportunities and problems.

The eastern region comprises the Townships of Torbolton, March, a portion of eastern Nepean, Fitzroy, Huntley, the north-west corner of Goulbourn, the northern half of Beckwith, the northern half of Drummond, and all of Ramsay and Pakenham.

This portion of the Authority is experiencing growing tourism and recreation pressures from the urban area of Ottawa. The south shores of the Ottawa River and Constance Bay, which are classed 1, 2, and 3 by the ARDA recreation land classification scheme, are nearly fully developed with cottages. Lake Mississippi in the south-east corner of the watershed is fully developed also.

A number of individuals are establishing summer and year-round homes on farms and by streams and ponds in this area. The majority of these people work in Ottawa and commute to and from their country homes. This situation has resulted in a number of problems with regard to transportation, land values and stream pollution.

The central region is the smallest, the least developed, and the least accessible of the three. It consists of the Townships of Darling, Lanark, the north half of Bathurst and the south-east half of Dalhousie.

The landscape is primarily marsh and bog. No class 1, 2, 3 or 4 land is found in this area. The uplands are covered by scrub. For the most part, the whole area is impoverished in all aspects.

Some development in the way of cottages and summer lodges has taken place on Clayton and Taylor Lakes but on the whole this section offers the least potential for recreation.

The western region, which consists of the remainder of the municipalities in the Authority, lies within the Precambrian Shield and is typical "Shield country", with many lakes, rivers, and streams. The principal lakes are Sharbot, Cross, Clarendon and Mazinaw. Class 1 to 4 shoreland is predominant in this area.

This region is rapidly gaining in popularity and problems with uncontrolled cottage subdivisions and pollution occur.

This section contains three Provincial Parks: Bon Echo, Black Lake, and Silver Lake; and a number of lodges, cabins, motels and other tourist facilities.

Of the three, this region offers the greatest recreation potential.

A number of roads lend themselves to development as scenic drive routes. Some of the roads for these routes are in fair condition, while others are poor. It has been found that people driving for pleasure do not object to hills or curves, provided the roads are of a suitable width, and are smooth and dust-free. Some roadsides suffer from the unsightly effects of sprayed vegetation, whereas cutting and trimming would be preferable where clearing is required.

The burgeoning cottage development, including that on Crown lands, has followed the traditional strip development. On some lakes, cluster development would be preferable. The adoption of subdivision control by-laws by municipalities would ensure the maximum utilization of lake frontages.

Upland areas abound which could be established as managed, natural areas or even wilderness areas. One area is the Sharbot Lake - Calabogie railroad right-of-way. Others are the Eagle Hills-Duck Lakes region and the marsh area around Mallory Lake.

Some opportunities exist for the development of areas following the "use-corridor" concept. Sections of the abandoned Sharbot Lake - Calabogie railroad would lend themselves to such development. For example, the railroad right-of-way could be used for cross-country skiing and trail riding, while a hiking trail would run parallel to, but separate from, the cleared roadway. This would preserve the naturalness of the hiking trail, yet allow clear passage for skiers and riders, and one group would not interfere with the other. Both realize maximum benefit from minimum space.

The Mississippi Valley Conservation Authority clearly has many opportunities for outdoor recreation. The demand for recreation facilities and space is growing rapidly in this area, and careful planning is required to maintain a livable environment which may be passed on to future generations.







This economically unviable farm in the central sector of the watershed offers many opportunities for outdoor recreational pursuits.



Typical landscape of the western sector of the Authority.



Horseback riding on the abandoned railway.





SECTION 8

HISTORICAL DEVELOPMENT

The first settlers in the Mississippi watershed were from the large contingent brought from Scotland to the new Perth Military Settlement under government auspices in 1815-1816. Joined by soldiers from disbanded regiments and individual settlers who made their own way to the newly-surveyed townships of Beckwith, Drummond and Bathurst, they quickly settled along the Mississippi and on the lands of the area that seemed likely to support pioneer agriculture. Two more organized waves of immigration followed shortly afterwards, the one principally due to the efforts of Scottish emigration societies, and the other to Peter Robinson, the former Commissioner of Crown Lands, who superintended the settlement of hundreds of Irishmen in the 1820s. In the decade after 1816, what is today the valley's eastern townships were surveyed and comparatively well occupied. After that time the Canada Company helped to fill up the spaces with its land sales. A generation later, in 1850-51, when the first thorough census was made, each of the eight townships in the eastern section had more than 2,500 inhabitants and of the remainder only Lavant with its 98 persons did not have a population numbered in the hundreds. From the western section of today's Authority region, by contrast, there were no returns at all, both because of the administrative unit arrangements of the time, and because the populations had been "not established." Early development was, therefore, to all intents and purposes confined to the eastern group of townships.

During the first years, the land was cleared and sown to wheat, rye, corn, potatoes, and sometimes peas, pumpkins and turnips. A few head of livestock were also kept. However, farming was a next-to-impossible task on much of the land. In Fitzroy, Ramsay, Drummond, Beckwith, Bathurst, Huntley, Torbolton, March and Goulbourn, there were extensive tracts of good clay loam, mixed with sand, rock and ridge, but the nearer the approach to Pakenham, Darling, Lanark, Dalhousie and Lavant, the more obvious became the characteristic formations of the Laurentian Shield, land which the first surveyor recognized "cannot be deemed sufficient as a grain country".

What the area as a whole did have was water. The Mississippi's "many good mill seats" attracted pioneer entrepreneurs from the beginning. Construction of both saw and grist mills was started on the site of Almonte as early as 1819 and, after they were destroyed by fire and replacements built in 1821-22, Shipman's Mill (as it then was) served the milling needs of settlers for many miles around. Farther up the Mississippi, at Morphy's Falls (Carleton Place after 1830), a grist mill was raised in 1820 and, before the end of the following year, a sawmill, a potash factory, a tannery and other typical pioneer enterprises were added. Elsewhere along the river, at Norway Pine Falls (Blakeney), Apple Tree Falls (Appleton), and Pakenham Mills, there were other mills within a few years, and the numbers continued to grow.

With the land far from suitable for grain growing, a good many settlers took the advice of the first surveyor in the area to "resort to Potash making", preparatory, as they thought, to turning tracts of cleared poorer land over to grazing. A number of factories were built capable of producing fairly large quantities of refined potash, for which there was a ready market in Quebec and, from there, across the Atlantic. Yet even in the early 1820s there was a clear alternative to burning wood. The forests were full not only of hardwoods, maple, beech, oak, ash, basswood, and so on, but also, along the rivers and streams, with white and red pine, quantities of which were cut, before there was a settler in the region, by organized groups from farther down the Ottawa.

During the remainder of the 1820s, and for several decades afterwards, the squared timber trade, and the trade in sawn lumber to the United States that soon followed, determined the shape of development. At first it was common practice for men to take to the woods in winter, to sell their cut locally, and to continue farming on a part-time, or summer, basis. But after the completion of the Rideau Canal, the release of thousands of labourers for alternative employment and a ready route to the south and the American market, combined with the increasing distances between settlements and the winter shanties and the fluctuations in prices, created conditions which no small-scale enterprise could absorb. The great organized firms took control and lumberjacks became a specialized breed — a "rural proletariat." Down the Mississippi and the Clyde, the Caldwells, Gillies, Gilmours and others floated hundreds of thousands of square feet of timber annually and thousands of logs as well. Actual exploitation of the forest resources was, however, only one side of the story. The great giants of the Ottawa Valley trade employed thousands of men located in hundreds of different shanties and requiring hundreds of horses and oxen. John Egan's company, for example, was estimated to have spent around \$2,000,000 on its operations each year.

Local farmers helped fill the demand for livestock and food. Certain of the less perishable, and less bulky, articles could be, and were, brought in from the States or from Montreal along the Ottawa River, but oats, hay, potatoes and peas were, from the lumberman's point of view, more satisfactorily obtained from the farmers of the Ottawa Valley, and wheat and pork prices at Bytown (and then Ottawa), frequently reached, by the standards of the time, astronomical heights even for a seller's market.

Many farmers, particularly from the 1840s, regarded the boom with mixed feelings, realizing that it depended on British and American demand for lumber which, so they were told from time to time, could not be relied upon indefinitely. Partly for this reason, little marginal land was brought into use in the eastern section of the area drained by the Mississippi. Demand from the shanties for local agricultural produce in fact declined only slowly after mid-century, and, although prices fell with the coming of the railways, there were still farmers in the 1880s who sold practically all of their produce to lumbermen. In the townships west of Oso, Palmerston and Canonto, however, lands that few informed local persons would look at were advertised, after the official colonization roads policy got underway from 1853, as having soil "almost always the best", on which crops could supposedly be raised and very profitably sold to lumbermen then on the Upper Madawaska. Colonization roads, intended to aid settlement and access to the



shanties, were run through Kaladar, Barrie, Anglesea, Abinger and Denbigh (the Addington Road), through Clarendon and Miller (the Frontenac Road), through Sherbrooke, Palmerston, Clarendon, Miller and Abinger (the Mississippi Road), through Darling and Palmerston (the Lavant Road), and on to places outside the area of today's Mississippi Authority. Reports were optimistic for some years, but after the mid-1860s no more settlers could be tempted in and many persons simply abandoned their grants. From the 1880s, farmers on the fertile stretches of the eastern townships generally found it most profitable to participate in the dairying and cheese-making that is still, in the 1960s, typical of eastern Ontario.

For brief periods after the 1840s when iron ore was discovered in South Sherbrooke, the mining potential of the Mississippi region attracted attention, and deposits at Silver Lake, Christie Lake, and in Palmerston, Dalhousie and Lavant, were considered valuable enough to exploit, despite transportation difficulties. In Lavant the Bethlehem Iron Company's mine produced 50 tons a day in the early 1880s, but more than 50 per cent of the selling price in the States was often consumed in the transportation costs. After 1883, depression in America, and the imposition of restrictive iron tariffs, put an end to the export of iron ore. When, after the turn of the century, the trade was resumed, mining had moved far to the north and west, away from the old settled parts of Ontario.

Between 1884 and 1931 there were periods of extended activity at the Kingdon lead mine in Fitzroy. In the last years of the 19th century some ore was shipped to Kingston for smelting, but the mine did not operate in the present century until 1915 and it closed again in 1931, after more than 130,000,000 pounds of lead and zinc concentrates and pig lead had been extracted, when markets for lead practically ceased to exist.

There was, however, a characteristically local industry less affected by outside fluctuations than were farming, lumbering and mining. This, perhaps naturally in view of the number of former Scottish weavers among the first settlers in Lanark, was the manufacture of woollen textiles. In Ramsayville (Almonte), there was a mill producing woollen cloth in 1850 and a decade later the village had a total of three such mills including the Rosamond's which was reputed to be as large as any in Canada. In the 1870s, the largest of three woollen mills in Carleton Place produced some 3,000 yards of finished cloth a week and employed 70 persons. Both towns have continued the production of textiles, cotton now as well as woollen, and in the village of Lanark a long-established textile mill remains the principal industry.

As was the case in other parts of eastern Ontario, the high point of local development was reached with the railway extensions in the last three decades of the 19th century. At that time, Carleton Place and Almonte were described as important manufacturing towns. Both had foundries and machine shops producing heavy as well as light machinery; wagon and carriage works; cabinet and sash and door factories; different types of mills, and were main stations on the Canada Central line which became part of the C.P.R.'s transcontinental route. Some of those industries still exist today and have in fact been extending their operations in more recent times, and other industries have been added. There is an electronics firm of consequence in Carleton Place and a sheet metal operation in Almonte, but neither town can pretend to compete with the great industrial complexes elsewhere in the province.



In size, both towns have changed relatively little since the 1880s: Almonte had a population of 2,684 in 1881, and in 1961 it had 3,267; Carleton Place's inhabitants numbered 1,975 in the former year and 4,796 at the beginning of the present decade. The populations of the townships have decreased over the same period as, of course, has happened elsewhere in rural Ontario, but the summer populations have undoubtedly increased many times over. From Mazinaw Lake, where there was a resort even before the final timber drive went through just after the turn of the century, to Mississippi Lake where there are some five hundred cottages today, the part that recreation and tourism play in current development is everywhere evident.

## SOCIAL AND ECONOMICAL DEVELOPMENT — PART 3

### SECTION 9

#### GENERAL DESCRIPTION

##### 1. Population Characteristics and Projections

###### a. Population Characteristics

The population characteristics of the Mississippi Valley Conservation Authority were examined for the period between 1911 and 1968 inclusive and are shown by County in Table 9-1. These statistics cover only those parts of counties lying within the Conservation Authority.

In general, the population growth in the Frontenac, Lanark, Lennox and Addington and Renfrew Counties has remained static or decreased slightly in the period 1961 to 1968. Population growth is occurring almost entirely in the Carleton County area, now part of the Regional Municipality of Ottawa-Carleton. There is little likelihood that this population growth pattern will change appreciably in the future. Urban development in the Kanata, Glen Cairn and Stittsville areas will account for most of the anticipated population growth. Modest growth is also likely in Carleton Place and Almonte as transportation links with Ottawa are improved.

This population concentration will have to carry the bulk of the Authority's financial requirements, but it will also be the population which will derive the greatest benefit from Authority projects.

###### b. Population Projections

Table 9-1 reveals that the population growth since 1961 has been concentrated in the Ottawa-Carleton part of the Authority. Growth in the remainder of the Authority has been static or declining. In establishing a projection of the population growth for the period 1968 to 1988, it was assumed that the growth would be concentrated in the Regional Municipality of Ottawa-Carleton and would occur at the rate of 5.5 per cent per year. This growth rate is the approximate average for this part of the Authority for the 1961 to 1968 period. This 5.5 per cent per year growth rate is almost double that for the whole of Carleton County, but is considered reasonable because of the development commitments at Kanata and Glen Cairn.

It was further assumed that the population in the remainder of the Authority would remain static.

The projected population for the Mississippi Valley Conservation Authority for 1988 is 48,360 persons, consisting of 29,470 in the Ottawa-Carleton portion of the Authority and 19,160 in the remainder of the Authority, as shown in Figure 9-1.

TABLE 9-1  
POPULATION CHARACTERISTICS\*  
MISSISSIPPI VALLEY CONSERVATION AUTHORITY

County (Part within Conservation Authority)	(Dominion Bureau of Statistics)										(Department of Municipal Affairs)					
	1911	1921	1931	1941	1951	1961	1966	1961	1966	1961	1963	1964	1965	1966	1967	1968
Carleton % Change	6,616	6,380	6,852	5,569	5,345	7,259	7,993			6,796	7,279	7,411	7,963	8,747	9,027	10,103
Frontenac % Change	3,318	2,839	2,736	2,809	2,607	2,464	2,360			2,441	2,172	2,313	2,245	2,198	2,248	2,233
Lanark % Change	17,132	15,952	15,637	15,770	15,855	16,297	16,526			16,235	16,532	16,598	16,574	16,361	16,532	16,485
Lennox & Addington % Change	402	319	298	419	425	386	348			366	370	379	355	346	338	336
Renfrew % Change	131	116	117	108	108	101	125			97	102	99	108	119	108	106
TOTALS	27,599	25,606	25,640	24,675	24,340	26,507	27,352			25,935	26,455	26,800	27,245	27,771	28,253	29,263
% Increase		-7.6	0.1	-3.2	-1.9	8.2	3.5				2.0	1.8	1.8	1.3	1.2	3.1

\* Source: Ontario Population Statistics; Community Planning Branch, Department of Municipal Affairs 1967.



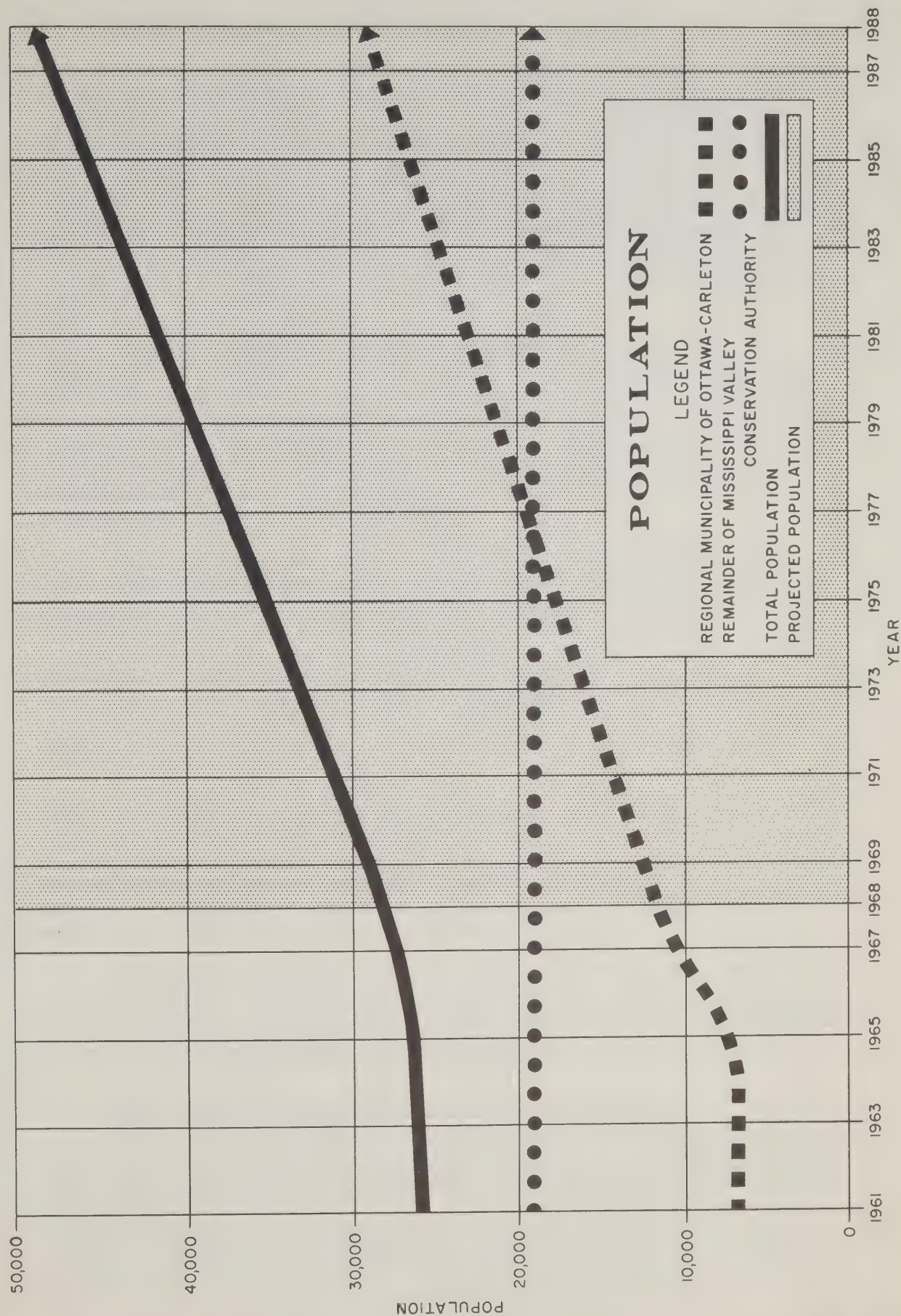


FIG. 9-1



## 2. Social Structure and Institutional Arrangements \*

The Mississippi Valley Conservation Authority consists of two major and one minor physiographic regions, each of which has been largely responsible for past and present patterns of physical and social development. Prosperous farms, small rural service centres as well as the overspill of urban development from Ottawa are characteristic of the area generally east of a north-south line through Carleton Place. Transportation corridors and economic influence tie this area physically and socially to the metropolitan Ottawa area. In 1969, as partial recognition of this, a substantial part of this area of the Authority was incorporated into the new Regional Municipality of Ottawa-Carleton. Generally, this area exhibits all the characteristics of the urban fringe of most metropolitan centres.

West of this general north-south line through Carleton Place, in sharp contrast to the eastern area, adherence to sub-marginal agriculture and forestry has been responsible for the rural poverty that pervades the economic and social fabric. On the whole, the people of this area are unable or unwilling to participate in the formal organizational structure of their dispersed community, because of the lack of money, the long hours of work, irregular employment, poor transportation facilities and roads and the general absence of community facilities.

In considering programs or projects, the Authority must weigh carefully these social characteristics, since the implementation of projects requiring general public participation and acceptance could be fraught with difficulties. Although it is not yet an established trend, the influx of non-farm residents from urban centres may in time substantially alter this social structure. Usually these individuals are concerned with preservation of the rural environment and actively promote conservation work. Unfortunately, however, they consider their land as a most personal possession and prohibit public access for recreation at a time when demand is increasing.

The establishment, in 1969, of Boards of Education on a County basis, as well as the eventual implementation of regional units of government, will help to bring the residents of this major part of the Authority into the mainstream of the social and economic life of adjacent urban areas. The better educational opportunities and public facilities that can best be provided on a regional basis will be the main reason for such an improvement.

At present, there are 22 local municipalities in this part of the Authority generally west of Carleton Place, each with a limited assessment base. No doubt the advent of regional government will reduce the number of municipalities and facilitate the handling of common problems.

## 3. Major Types of Economic Activity and Employment

Statistics on economic activity and employment are compiled by the Dominion Bureau of Statistics (D.B.S.), on a county basis and therefore this information for the Mississippi Valley Conservation Authority can only be

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\* Source: A preliminary report on Rural Poverty in Four Selected Areas; ARDA, Canada Department of Forestry; 1965.



interpolated generally. The statistics for Carleton County are a reasonable indicator for the more prosperous area of the Authority generally east of the north-south line through Carleton Place; while details for Lanark County adequately describe the remainder of the Authority.

Table 9-2 shows the distribution of employment by major types of economic activity and compares this distribution to that of the Province as a whole. An examination of this Table clearly shows that the Carleton County portion of the Authority has had growth rates, in almost all industry groups, far in excess of provincial rates. In sharp contrast, the remainder of the Authority, as exemplified by Lanark County has had an overall labour force growth of approximately one-sixth that of Carleton County, and one-fourth that of the Province. In both counties the decline in labour force engaged in agriculture has been almost double that of the Province. In Lanark County, the only increases have been in industry groups generally offering services to people; i.e., Trade, Finance, Insurance, Real Estate, Services (including Government), and Construction.

Since recreational demands increase with urbanization, it is reasonable to assume that much of the labour force growth in the service sectors in Lanark County is attributable to the recreation industry. The implications of this on the activities of the Authority are both good and bad. The Authority could undertake projects designed to meet part of this recreational demand and thereby provide employment opportunities for the less fortunate part of the Authority. On the other hand, it is probable that land costs for Authority projects will rise sharply as competing private demands for cottage sites and commercial resorts increase. Land acquisition rather than development, therefore, should be an initial objective of the Authority.

#### 4. Income

The D.B.S. figures on individual and family income in 1961 for Carleton and Lanark Counties were used as indicators of the extremes of rural poverty and relative prosperity in the Mississippi watershed. Table 9-3 outlines the pertinent statistical material.

Table 9-3 clearly indicates one of the potential operating difficulties that could be faced by the Authority. Over most of the Authority, as represented by the Lanark County figures, only an extremely small percentage of wage earners are in the \$6,000 and over range — approximately half the provincial figure and one-third the Carleton County figure. At the same time, the percentage of wage earners with incomes of less than \$1,000 per year is significantly higher in Lanark County than in Carleton County. The average family income in Lanark County is also significantly low.

The above analysis must be kept in clear focus when considering a program for the Authority, since the majority of Authority representatives come from the economically marginal area generally west of Carleton Place, while the Authority's funds can only come from the more prosperous rural and urban eastern part of the Authority.

Sound resource management programs can only mean that the Authority must vigorously promote and support land-use planning controls.

TABLE 9-2

LABOUR FORCE BY INDUSTRY GROUP, 1951 AND 1961  
CARLETON AND LANARK COUNTIES\*

	Total All Industries <sup>+</sup>	Agriculture	Fishing and Trapping	Forestry	Mines and Quarries	Manu- facturing	Con- struction	Transport Communication & Utilities	Trade	Finance Insurance Real Estate	Services (Incl. Public and Defence)
Carleton	1951	4,957	30	97	90	10,941	6,011	7,143	13,880	4,558	53,206
	1961	3,157	27	149	153	11,616	9,088	9,703	18,693	6,744	78,701
	% Change	-36.3	-10.0	53.6	70.0	6.2	51.2	35.8	34.7	48.0	47.9
Lanark	1951	2,905	1	77	42	3,394	976	1,693	1,643	209	2,001
	1961	2,026	—	74	6	2,868	1,078	1,610	1,817	306	3,823
	% Change	-30.3	-100.0	-3.9	-85.7	-15.5	10.5	-4.9	10.6	46.4	91.1
Province of Ontario	1951	201,482	2,259	23,030	30,653	615,358	127,494	158,125	267,267	61,728	379,129
	1961	168,775	2,185	17,935	42,660	643,284	153,866	195,223	370,540	98,454	648,390
	% Change	-16.2	-3.3	-22.1	39.2	4.5	20.7	23.5	38.6	59.5	71.0

\* Source: Economic Material on the Eastern Ontario Region; Ontario Department of Economics and Development, October 1965

<sup>+</sup> Includes persons not reporting industry

TABLE 9-3

WAGE EARNER AND FAMILY INCOMES  
CARLETON AND LANARK COUNTIES — 1961\*

Jurisdiction	Earning Less Than \$1,000 Per Year		Earning \$1,000-\$5,999 Per Year		Earning \$6,000 and More Per Year		Average Family Income
	No.	% of Total Wage Earners	No.	% of Total Wage Earners	No.	% of Total Wage Earners	
Carleton	12,210	9.3	98,336	75.0	20,545	15.7	6,879
Lanark	1,568	14.4	8,672	79.9	618	5.7	5,306
Province of Ontario	252,553	12.3	1,592,592	77.4	213,218	10.4	5,868

\* Based on statistics contained in Economic Material on the Eastern Ontario Region, Ontario Department of Economics and Development, October 1965



With a growing demand for cottage and recreation sites, marginal farmers have found a new source of income, but unfortunately the benefits are very short-termed. The new source of income is mainly the sale of cottage lots to urban residents, but the problems inevitably created are beyond the administrative capability of most municipalities in the region. In fact, the short-term need to supplement low incomes has made it socially unacceptable to implement the very planning controls that would substantially increase the total income of the rural-based population over a long-term period. Without this planned growth, the remaining assets of lake frontage and rural environment, which are major elements in sound resource management, are lost and unnecessary long-term hardships are imposed on the permanent local residents as well as on the part-time residents. Part-time residents may have difficulty in finding those amenities which they require for day-to-day living, while permanent residents may derive no continual income from the presence of their urban, part-time neighbours.

## 5. Current Economic Growth Characteristics

Urban-centred activities such as personal services, manufacturing and recreation have the greatest economic growth potential for most of the Mississippi watershed. Yet, in realizing this potential a serious social problem — that of uprooted farm families unable to cope with the changes forced upon them by the structural changes in the economic system — must be faced. Labour mobility between jobs, between places, and between occupations is vital. Unfortunately, the type of adjustment required in mobility is more difficult for farmers than for other members of the population.

The best bridge between low income farming prevalent over most of the Authority and the more lucrative non-farm employment is part-time work off the farm. This on-and-off-the-land pattern of living now exists and has since earliest days. Unfortunately, however, there are insufficient varied job opportunities to provide part-time non-farm work over most of the year.

The future urban development proposals set forth by the National Capital Commission for the year 2000 show substantial population increases in that portion of the Authority lying within the new Regional Municipality of Ottawa-Carleton. This urban growth, coupled with that of metropolitan Ottawa, is already greatly increasing the demand for recreational facilities in the rural hinterland. Recreation could thus form one of the most important elements of the economic base for the rural parts of the Authority if properly planned. To a lesser extent the extraction of building materials such as marble, limestone, sand and gravel will improve the economic base of the watershed.

Fortunately there is still sufficient land with recreational potential to establish regional recreation areas using properly planned programs. This basic re-orientation of local thinking requires the full co-operation of all municipalities in setting up standards of development and enforcing these standards uniformly. Except for the Regional Municipality of Ottawa-Carleton, individual municipalities have neither the money nor the staff to implement or enforce such development controls. Some form of joint action by groups of municipalities is obviously necessary. The Mississippi Valley

Conservation Authority, because its purpose is to manage wisely the renewable resources, must help work out and supplement any program of education and implementation evolved in the region. Within this program an emphasis should be placed on setting up local demonstration projects which show methods of utilizing wisely the recreational demand.

## 6. Urban Centres and Their Influence

The physical, social and economic influence of urban development in the metropolitan Ottawa area is a vital factor in the future development of the Mississippi watershed. Urban developments at Kanata, Stittsville and Glen Cairn will provide much of the assessment base for the Authority's funds, while the Authority's rural lands will meet the recreational demands of this urban population.

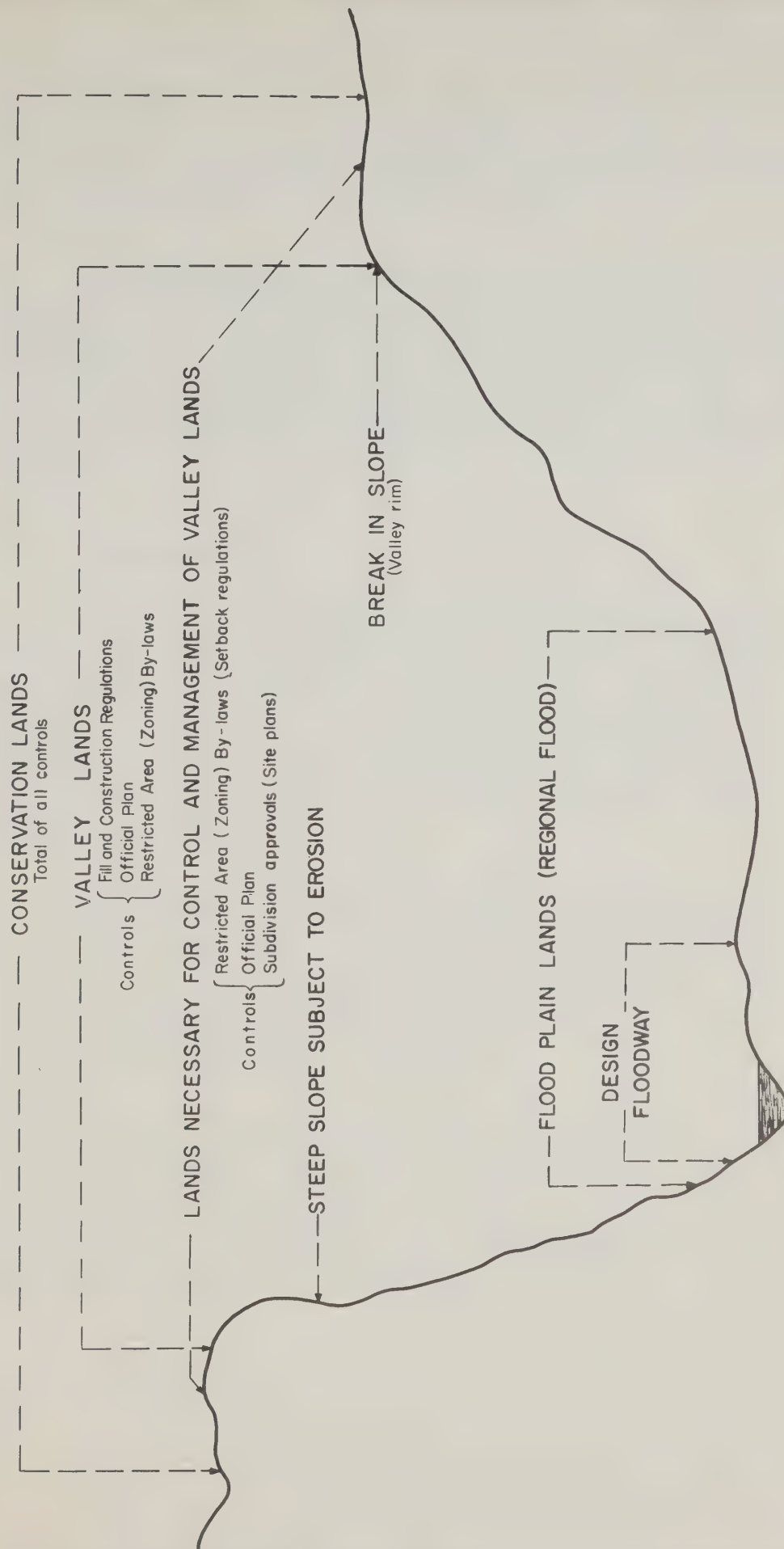
Carleton Place, Almonte and Lanark will attract urban growth and development emanating from the Ottawa area. This growth will, however, be restricted because of the limited opportunity for development of adequate sewage treatment facilities at these upstream locations. These three urban centres, as well as Perth and Smith's Falls outside the Authority, act as service centres for the permanent population. In the future their importance must increase as the recreation industry expands, and urban people seek retirement homes away from the city.

## 7. Land Use and Land-Use Regulations

Figure 12-2 shows the extent of settlement, of cottage development and of permanent urban or suburban development. It is apparent from this map that the urban pressures, principally of metropolitan Ottawa, are changing the land-use pattern significantly in the Mississippi watershed. Permanent urban-type development and part-time residences or cottages are the dominant influences in the region. Recognizing the potentials of these urban-based developments, it is imperative that united action be taken to carry out long-range planning programs and to implement development controls, so that the full potential of remaining recreationally valuable lands can be realized.

Under legislation setting up the Regional Municipality of Ottawa-Carleton, a Regional Official Plan must be prepared by the end of 1972. This Plan will cover the Ottawa-Carleton portion of the Mississippi watershed and the Authority should work closely with the Regional Council to ensure that necessary conservation measures are considered in this Official Plan.

The Authority should give immediate consideration to the implementation of fill and construction regulations under Section 26 of The Conservation Authorities Act, 1968. Flood plains and lands lying between the rims of deeply-incised valleys should be covered under these regulations. Once the regulations have been passed the Authority should maintain fullest co-operation with local municipalities to ensure that the regulatory policies of these administrative bodies are consistent. The Authority should give top priority to urban or urbanizing areas, when implementing these regulations. Figure 9-2 shows a typical cross-section of a river valley and the types of land-use controls that can be applied to ensure sound conservation practices.



TYPICAL CROSS SECTION OF A RIVER VALLEY  
AND POSSIBLE LAND-USE CONTROLS





Existing subdivision control, zoning and official plan regulations are confined mainly to the area of the Authority generally east of Carleton Place, where the urban pressures of Ottawa are most pronounced. Table 9-4 indicates those municipalities within the Authority that have either adopted or are preparing land-use planning controls. The other municipalities have no such controls.

The Authority must encourage member municipalities, either individually or preferably jointly, to adopt a planning program including subdivision control, official plans and zoning by-laws to ensure the sound management of the renewable resources. Existing land-use controls should be reviewed by the Authority to determine the adequacy of conservation measures, and any necessary changes recommended to the appropriate local councils and planning boards. Extreme slope (over 20 per cent), scenic value, and flood and erosion susceptibility should be key elements of such a review.

## 8. Transportation

The greatest concentration of transportation facilities within the area of the Authority is generally east of the north-south line through Carleton Place. Major highways include 7, 17, 15, 29, and 44. All but Highway 29 focus on Ottawa, in recognition of its regional role. Throughout the remainder of the Authority, local and county roads make up the road network. Highway 38 from Kingston is potentially important to opening in the western part of the Authority. Before the recreation potential of this area can be developed, substantial improvements to the road and highway networks will be required. It is essential however that land controls precede highway developments.

In planning the road network a thorough analysis of the best development pattern should be carried out. Consistent with sound regional planning and resource management, certain sections of the region might best be set aside as wild areas. This requires a limitation of automobile access routes. The Authority should co-operate fully with the Departments of Lands and Forests, Highways and Municipal Affairs, with the counties to ensure that road-building projects do not adversely affect the renewable resources and the recreation potential of the watershed.

Both Almonte and Carleton Place are on the main line of the C.P.R. from Montreal to North Bay. The latter is also served by C.P.R. line from Brockville and Smith's Falls, which is at the intersection of the Montreal to Toronto and the Ottawa to Brockville lines of the C.N.R. These rail lines linking both Montreal and Toronto to the Mississippi watershed could prove to be important access means for the vast urban populations seeking new and different recreation areas, especially of the resort type.

TABLE 9-4

LAND-USE PLANNING CONTROLS\*  
MISSISSIPPI VALLEY CONSERVATION AUTHORITY

Municipality	Subdivision Control Part within the Authority	Official Plan	Zoning By-Law
Beckwith Township	Entire Municipality	Nil	Nil
Goulbourn Township	Entire Municipality	Under preparation	"Holding By-Law" only (zoning by-laws under preparation)
March Township	Entire Municipality	Entire Municipality	Under Preparation
Nepean Township	Entire Municipality	Nil	Entire Municipality
Ramsay Township	Entire Municipality	Nil	Nil
Stittsville Village	Entire Municipality	Nil	Entire Municipality
Torbolton Township	Entire Municipality	Referred to Ontario Municipal Board	Nil

\* Department of Municipal Affairs, Community Planning Branch



## SOCIAL AND ECONOMIC DEVELOPMENT — PART 3

### SECTION 10

#### AGRICULTURE AND RELATED ACTIVITY

##### 1. Major Livestock Enterprises

Agricultural farming enterprises within the Authority area can generally be considered as mixed farming with the emphasis on livestock production such as beef cattle, swine, sheep and dairy cattle, with the last playing the more significant role. Dairy farm operations, although gradually decreasing in number, have utilized the better soils in the eastern segment of the Authority for forage production and better pasturage. Furthermore, the influences of a large urban centre upon an agricultural area has forced the farm operators to maximize farm land use by means of increased activity for the production of quality feed stuff for livestock operations. A concentrated attempt to produce high quality feed grains and corn silage on a home-grown basis can assist the farmer to reduce operating costs and increase the number of animal units per farm. In some instances, there has been a definite switch from dairying to beef cattle operation. However, this transition is more evident in other sectors of the Authority. Commercial farms are more numerous in the eastern sector of the Authority where the more aggressive farmers have taken advantage of the potential corn productivity, and consequently reduced their livestock feeding cost.

In that portion of the Authority lying between the Mississippi River and the edge of the Precambrian Shield, a transition of dairying to beef cattle operations seems to be under way with the beef operations now numbering slightly more than the dairying operations. Soils in this area are generally higher in capability. Consequently, corn and barley production have made an inroad in acreage cultivation in the central segment. Forage crop production and pasturage still provide a considerable proportion of the feed grain for the mixed livestock operations of beef, dairy, swine and sheep.

A four-township survey of a number of farm operations revealed that the farms studied in Lanark and Ramsay Township (which lie in the central segment) were primarily 61 per cent and 46 per cent beef operators respectively\*. Of the farms studied in Dalhousie Township, 99 per cent were beef operations and in Huntley Township, in the eastern sector, only

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\* The four townships were selected on the basis that each township's entire area is located within the Authority. The percentage breakdown of the livestock farms studied are as follows:

	Dairy Cattle %	Beef Cattle %
Huntley Twp.	58	42
Ramsay Twp.	54	46
Lanark Twp.	39	61
Dalhousie Twp.	1	99

TABLE 10-1		
NUMBER OF CENSUS AND COMMERCIAL FARMS* LOCATED WITHIN TOWNSHIPS HAVING A MAJOR PORTION LYING WITHIN THE MISSISSIPPI CONSERVATION AUTHORITY (1966 Census)		
Township	Census Farms	Commercial Farms
Fitzroy	251	178
Huntley	159	92
March	79	38
Torbolton	82	35
Dalhousie & N. Sherbrooke	106	47
Darling	32	3
S. Sherbrooke	47	20
Lanark	155	77
Lavant	19	4
Pakenham	161	92
Ramsay	221	145
Barrie	12	1
Clarendon & Miller	29	1
Palmerston, N. & S. Canonto	23	7

42 per cent were engaged in beef operations. These figures tend to indicate the shifting from dairy to beef operations as one moves further westward into the Authority, and may reflect some relationship upon the soil productivity for feed grain production and forage-pasture productivity<sup>+</sup>.

The Precambrian Shield forms the western segment of the Authority where the low agricultural capability soils of Tweed and Monteagle sandy loam-rock complexes are prevalent. As crop production is rather limited on these soils, the open spaces are utilized for the grazing of beef cattle, which is the predominant livestock production in this segment of the Authority. Sheep production is almost nil. The farmers consider the risks from predators too high for sheep rearing.

The local productivity of the soils and the low carrying capacity of the pastures are evidenced by the number of small farm holdings with low farm income. In fact, the number of commercial farmers is almost negligible in this sector of the Authority. Woodlot grazing is prevalent in these areas as farmers attempt to increase the grazing areas for their beef cattle.

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\* Census farm: agricultural holdings of one acre or more with agricultural product sales of \$50 or more during 12-month period prior to June 1, 1968.

Commercial farm: a census farm with sales of agricultural products of \$2,500 or more (institutional farms not included) during 12 months prior to June 1, 1966.

<sup>+</sup> In the three townships, i.e., Ramsay, Lanark and Dalhousie, which display a trend towards beef cattle operations, 16 per cent of the farms studied reported that the transition from dairy to beef operations occurred in the past five years, i.e., 1963-1968.

TABLE 10-2

## TOTAL ACRES CROP PRODUCTION FOR LISTED TOWNSHIPS\*

	Fitzroy	Huntley	March	Torbolton	Dalhousie, N. & S. Sherbrooke	Darling	Ianark	Lavant	Pakenham	Ramsay	Barrie	Clarendon & Miller	Palmerston, N. & S. Canonto
Oats	{1951 1961}	4,857 4,140	1,147 669	1,321 1,353	975 855	109 165	2,474 1,744	131 47	1,852 1,663	4,122 2,993	89 50	193 145	27 6
Mixed Grain	{1951 1961}	1,726 1,782	316 379	343 351	43 52	- -	211 188	- 25	1,248 1,171	1,305 1,453	- -	5 30	- 17
Barley	{1951 1961}	359 1,123	28 142	84 102	4 10	- -	10 120	3 -	209 858	287 566	- -	- -	- -
Corn Grain	{1951 1961}	37 15	10 208	- 15	- 19	1 -	3 15	20 -	18 18	53 20	- -	- -	- -
Corn Silage	{1951 1961}	843 2,223	135 284	141 246	201 250	9 3	331 672	14 13	379 908	492 1,568	- -	6 3	15 45
Tame Hay	{1951 1961}	11,380 10,109	3,829 3,235	4,293 3,219	4,388 3,820	751 648	5,870 5,631	366 546	6,371 5,706	10,734 10,122	289 178	811 817	671 725

\* Source: 1966 Census of Canada, Agriculture: Ontario



Overall, there has been a gradual decrease in dairy cattle in the Authority during the past few years, which may be attributed to milk and milk-product marketing conditions and high farm operating costs. In an attempt to reduce these costs, a shift into beef cattle operations is evident with the hope of making use of home-grown feeds to reduce feed cost on many of the farms.

## 2. Major Crop Enterprises

Cash crop farming enterprises have not become significant within the Authority and crop production has been directed toward the provision of home-grown feeds for livestock operations. As previously mentioned, the concentration of corn silage production is evident in the eastern segment of the Authority, where the better soils can be found. Corn grain acreage and barley production have increased in the past few years, while oats and mixed grains have shown some decline in production. Similarly, tame hay production has decreased. Cash crop operations might have been expected to increase more rapidly, since large acreages of soil suitable for corn grain production have not been utilized in the eastern portion of the Authority.

## 3. Other Agricultural Enterprises

### a. Apiary Operations

Most apiary operations are carried out as a source of secondary income, in which the operators have their colonies generally fixed in one location. A few transitory operators are evident, and at times friction has been created between the fixed and transitory collectors, but this has not been a major problem in this area.

Two operators work on a full-time basis, one of whom markets his own brand to points as far away as Montreal and overseas markets. The majority of the part-time operators market their products locally.

### b. Maple Syrup Production

Extensive stands of hard maple can be found within the Authority, especially in Lanark and Dalhousie Townships, that might be tapped for maple syrup. Since many farmers are unable to acquire experienced labour for the time-consuming operation of boiling down the sap, the production of maple syrup from this area has decreased in the past few years. Another problem is the reluctance of the operators to co-operate in establishing central operation facilities, or to innovate new and perhaps costly equipment. Two-thirds of the 22 members of the local Maple Syrup Producers Association sell their products to local consumers who reside within a 50-mile radius of the producer, with prices in 1967 ranging from \$4.50 to \$7 per gallon\*.

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\* Purvis, J. M. & Caldwell, H. W. The Maple Syrup Industry in Ontario; Dept. of Extension Education, O. A. C., University of Guelph Report #23, Dec. 1967, p. 11

#### 4. Volume and Value of Farm Output

Volume and figures for farm output for farming operations situated within the Authority area are rather difficult to ascertain, due to the fact that the Authority's boundaries do not coincide with the census boundaries. However, to shed some light on the dollar output, the county census figures for 1966 will be used. It is apparent that the largest percentage of income received by farmers in the area is from livestock enterprises, although in some instances logging and maple syrup operations make up a substantial portion of a farmer's income. In any event, the census data for the entire counties of Carleton and Lanark (the Authority does encompass a large proportion of these counties) reveal that the largest percentage of farmers received less than \$2,500 as total value of agricultural products sold.

TABLE 10-3			
VALUE OF PRODUCTS SOLD FROM CENSUS FARMS IN CARLETON AND LANARK COUNTIES*			
		Number of Farms	
		Carleton	Lanark
Commercial Farms	\$35,000 and over	43	25
	25,000 - 34,999	54	10
	15,000 - 24,999	182	45
	10,000 - 14,999	185	94
	7,500 - 9,999	123	103
	5,000 - 7,499	231	194
	3,750 - 4,999	136	162
	2,500 - 3,749	225	192
Commercial Farms - Total		1,179	825
Small Holding Farms	Under \$2,500	786	831
Institutional Farms		6	1
Total Census Farms		1,971	1,657

#### 5. Employment and Income

In the four-township survey carried out, it was found that farms are predominantly family-operated and that younger members of the family were taking over management responsibilities for those farms situated in the eastern segment of the Authority, whereas in the western segment, younger members of the families have departed to obtain non-farm employment. In the four townships surveyed, the average ages of the farm operator for the respective townships were: Huntley, 58; Ramsay, 55; Lanark, 53; Dalhousie, 45. To supplement the low farm income many operators obtain additional income from logging operations, non-agricultural jobs or pensions. These activities were more commonly found in the western segment of the Authority, that is, in the Precambrian Shield area.

\* Source: Table 15, 1966 Census of Canada, Agriculture: Ontario, p. 59.

## 6. Capital Investment

The largest percentage of farms in both Carleton and Lanark Counties fell within a range of \$25,000-\$50,000 for total capital investment. In particular, Lanark County had 486 farms of 1,657 census farms within this range; and Carleton County had 705 farms of 1,971 census farms within the \$25,000-\$50,000 range of capital investments\*. A number of farms in Carleton County have much higher capitalized value, although this could be attributed to the real estate value placed on the farms due to their proximity to Ottawa.

In those areas where the effect of urbanization is not as great, and the soil capabilities are rated high, the increase in real estate prices could possibly indicate anticipated farm net income. To increase net incomes on livestock operations, greater emphasis must be placed on livestock feed specialization, by increasing crop productivity through heavy fertilizer application and the production of high-value crops in areas where they were not previously grown.

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\* Table of Total Capital Value; 1966 Census of Canada Agriculture: Ontario, p.59.



SECTION 11

FOREST RESOURCES AND RELATED ACTIVITY

1. Extent and Nature of the Resource

About 60 per cent of the land area of the Mississippi Valley Conservation Authority is covered with forest of various types, not including wooded pastures which are the remnants of woodlands that have been grazed beyond their ability to recover the natural process of regeneration and re-growth.

A deep arc of Crown land is located along the Authority boundary in its western region, which is almost totally forested. This leaves an irregularly-shaped corridor of private lands through the centre of Barrie, Clarendon and Palmerston Townships, along the eastern boundary of Palmerston Township and the south-east corner of South Canonto Township. Elsewhere in the Authority virtually all land is privately owned with the exception of military and institutional lands.

During the 1968 survey, Crown-owned areas were not studied since they are under the jurisdiction and management of the Department of Lands and Forests.

Along the private land corridors mentioned above, clearing for agriculture has had only a minor influence on the extent of forest cover, since the cleared acreage varies from just over 3 per cent to just under 13 per cent of the townships concerned.

Elsewhere in the Authority's western region, a combination of various forms of pasture and grasslands has had a significant effect on forest cover in Kennebec, Olden and Oso Townships, where a form of ranching is still in use, creating continued pressure on general forest cover.

The Authority's eastern region — the area east of the boundary between Lanark and Frontenac Counties — has experienced far more clearing for agriculture. Although this cleared acreage varies by township, half of this region is generally in agricultural use and half is forested. It is interesting to note that no township in this region has as yet reached the stage where it is as much as 60 per cent cleared.

a. Forest Cover Types and Conditions

The main forest cover types in the Authority in order of frequency and area are as follows:

Aspen	White cedar
Poplar — oak	Black ash — white elm
White pine	— red maple
Sugar maple — basswood	Silver maple —
Sugar maple	white elm
White spruce — balsam fir —	White elm
paper birch	

In addition, 15 other cover types were mapped which occupy acreages of less significance. Some of these occupy a trace position only.

**FOREST COVER TYPES IN SETTLED AREAS:** The more significant acreages of aspen and its related types are in those townships that are in the low-class Precambrian Shield lands. The position of sugar maple and its related forest forms is significant in that its distribution is consistent throughout the Authority, both on higher-class agricultural lands and as a dominant component of the forest of the Precambrian Shield.

White elm and silver maple-white elm form a significant woodland component in the developed agricultural areas. The position of silver maple is rather variable in these stands, which tend to occupy the poorly-drained or wet lands of low agricultural capability that were left after clearing for settlement. On the Precambrian Shield, both of these cover types occupy positions of lesser significance.

Other wet areas contain significant acreage of black ash - white elm - red maple cover type.

Coniferous forest frequently occupies small but significant portions of the Authority's forest cover in settled areas. Much of this is in the form of white cedar. In 1968, observations also indicated that there are small but significant acreages of white pine and white spruce cover types.

**WOODLAND CONDITIONS IN SETTLED AREAS:** Survey observations showed the physical condition of forest to be as follows.

Spacing, or stand density, is the result of the exploitation that has occurred, as well as other pressures that have been placed on the forest. Regeneration descriptions indicate whether or not successful regrowth is occurring to replace trees that have been removed or that have died from various causes. Age classes indicate if further forest exploitation is warranted or should be curbed. Important as well is the effect of local pasturing practices. These have affected forest cover since settlement, although to a different degree within different portions of Ontario. This is because, in some areas, changes in agricultural efficiency and practice have removed a great deal of the grazing influence in wooded areas.

Despite variations by township, most of the forest on private lands in the Authority's settled area is contained in two diameter ranges. These are the 4- to 10-inch range and the 10- to 18-inch range. Hence a universal degree of merchantability can be said to exist in local woodlands, mainly as small timbers and pole wood, posts and pulpwood. Large saw-timber-sized trees were found in small quantities in 1968.

Despite the favourable size classes, the indications of merchantability are offset by a number of forest problems that are

universal in eastern Ontario. These are the inferior quality of many stands, inadequate stand density, and the poor condition of forest regeneration created by continual forest grazing by livestock. In general this was found to have occurred in 62 per cent of the wooded areas observed in the settled area during the 1968 survey.

Higher incidences of woodlot grazing occur locally in areas of higher agricultural capability (agricultural classes 1, 2, 3 and 4, and complexes of these classes).

**FOREST COVER TYPES IN REMOTE AREAS:** The coniferous component of local forest is generally greater on private lands in the northern part of the Authority than in the more settled areas. In addition, a significant coniferous forest is present in Dalhousie Township where white pine is a major component of the forest cover. There are occasional instances of red pine being a significant forest stand component, particularly in Clarendon Township. Poplar, either as a stand or major stand component, is locally important, since 40 per cent or more of the woodland studied in more remote sections was aspen or poplar-oak.

**WOODLAND CONDITIONS IN REMOTE AREAS:** The forest on privately-owned lands some distance from the existing road system is essentially in the same two diameter ranges as in settled regions. Just over 57 per cent of the area surveyed in 1968 was in the 10- to 18-inch DBH\* class or small saw-timber size. A further 38 per cent is in the 4- to 10-inch DBH range, the smallest merchantable range. There is a distinct lack of young growth, that which is in the diameter range below 4 inches DBH.

Within these remoter areas, the density of forest cover is generally unsatisfactory. Half of this forest cover has only a fair density, and another 45 per cent is poor or open.

A similar situation exists with respect to forest regeneration, since 65 per cent of the forest area examined by traverse showed little or no young seedling trees. This is more due to species intolerant to root and shade competition than it is to the effect of grazing, which is less of a problem in sparsely settled areas.

b. Wooded Pastures

Wooded pastures are unimproved pasture in woodland composed of open-grown trees. They were originally woodlots that have been gradually converted to this type of cover by continued grazing.

Within the Mississippi Valley Conservation Authority, this type of cover is more significant in the more populated sections of the Precambrian Shield where it represented the equivalent of 36.8 per cent of the woodland area surveyed in this region in 1968. On less easily reached privately-owned lands in this region, it represents the equivalent of only 3.8 per cent of the woodland area examined.

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\* Diameter at Breast Height



Elsewhere on land where the agricultural capability is greater, wooded pastures were the equivalent of 10.1 per cent of the wooded area examined.

c. Plantations

Reforestation is needed on cleared submarginal lands that should not be used for agriculture and that are in need of a return to more productive uses.

Previous sections of this report indicate that over 85 per cent of the Authority's lands are marginal and submarginal for agriculture. This includes cleared lands on its Precambrian Shield and limestone plain regions. A program of systematically changing the uses of this land away from agriculture is recommended.

It is useful to review some aspects of the present reforestation on private lands.

Although the average individual tree plantation acreage is a little over seven acres, there is a wide distribution of local plantations, ranging from one to five acres in area. Just over 11 per cent of these local plantations are 20 acres or more in area.

Local choice of species is confined to red pine, white pine, Scotch pine and white spruce, either in pure stands or mixtures of two or more of these species. The favoured species are red and Scotch pine. During the survey, no hardwood or mixedwood planting was observed.

Past reforestation efforts on the part of private individuals have been desultory. During the five years prior to 1969, the greatest effort of this type within the Authority has been made by residents of Carleton County. This involves landowners in the most productive agricultural area of the five counties concerned and probably the area of greatest urban and rural residential influence.

In contrast, in the two main counties occupied by the Authority, where major marginal areas are found, the acreages planted indicated room for a much greater response to any efforts at stimulation of private reforestation.

TABLE 11-1  
PRIVATE ACREAGE PLANTED TO TREES

<u>County</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>
Frontenac	108	120	131	155	162
Lanark	122	162	191	151	131

Local property owners tend to select mainly dry sites containing sands, gravels and sandy loams over granitic bedrock. Because these sites frequently involve various forms of undulating topography,

problems of both exposure and frost pockets in from one-quarter to one-third of the plantations established have been encountered. These problems are partially offset for some local private plantations which receive shelter from adjacent woodlots and hedgerows. Any use of plantations to provide shelter has been incidental rather than deliberate. About one-quarter of the plantations examined provided some shelter, mainly for adjacent fields.

Despite the hilly topography involved, machine planting, when done, has been kept on contour on only one-third of the plantation sites that were examined in 1968. Some hand planting has been done on steep slopes and rocky land.

Nevertheless, erosion on reforestation sites has been almost nil due to heavy grass layers.

As is common elsewhere in agricultural southern Ontario, a considerable management problem is apparent in private reforestation in the Authority. For example, the deliberate use of plantation areas as pasture is evident, as indicated by cattle damage to 35 per cent of the plantations studied. This is a problem that can be controlled by the owner without much difficulty.

The use of plantations by wildlife can be anticipated, bearing in mind that a major and desirable feature of many of the Authority's landscapes is its wildlife population. Commonly, a low incidence of plantation use and damage by deer, porcupines and mice is evident, but up to 25 per cent of the plantations observed have been used to date by rabbits, indicating a need for some controlled hunting. Owners can also expect some damage by birds, particularly Grosbeaks in Scotch pine.

The major damaging agents of local reforestation are insects, particularly sawflies, having been observed in over 70 per cent of the plantations studied, yet the use of spray controls was evident in only one case in 1968.

Despite the neglect of damage control, some management has been given to older plantations in the form of limited pruning, some thinning, and a little selective cutting. Less damage and more clear wood are provided by pruning with saws, rather than the present use of axes. There is an unfortunate incidence of vandalism in some plantations.

Based on the results of the limited studies done in 1968, plantations are likely to produce erratic growth and survival rates. Almost half the plantations observed had taken on a patchy appearance at an early age. However, the openings that occur should contribute to the general wildlife habitat, and gradual invasion of these openings by other tree species from local natural seed sources is probable.

**PLANTATION GROWTH:** In addition to normal observations made on the condition of local reforestation, annual and total height growth of a majority of the plantations examined was measured. This

was done to provide the Authority with an idea of what growth could be expected in any future reforestation program, whether on private lands or on its own.

These growth measurements were compared with those of plantations of similar age and species content in the Larose Forest — a forest whose site in the United Counties of Prescott and Russell is considered good for reforestation with its deep sands and desirable soil moisture characteristics. A similar 1968 study, done in the neighbouring Rideau Valley Conservation Authority, is comparable where sites are similar to those in the Mississippi Valley Conservation Authority.

Growth measurements were made of white pine, red pine, Scotch pine and white spruce, in the 7-, 8- and 9-year-old classes, since it was felt that such trees can be measured easily, accurately and quickly from the ground.

The bottom series of stem internodes were measured as well to develop a picture of how many years it had taken to begin greater consistent annual height growth after planting. This period of normally slow growth is called the "check" period, and varies according to species and site.

These measurements show that consistently good height growth cannot be expected on all sites. The initial period of growth "check" is somewhat larger than those which have occurred in the better sites of the Larose Forest, particularly in the case of white pine. There are still, however, attractive possibilities, particularly for red pine and white spruce. The evidence used indicates a potential for timber production in Clarendon, Barrie and Dalhousie Townships.

Areas of limestone plain in the Authority are obviously not as productive of consistently good growth as the Larose Forest. However, the performance of Scotch pine appears to be comparable to that on limestone plain sites in the Rideau Valley Conservation Authority, though somewhat slower. The performance of white spruce on limestone plain sites of the Mississippi Valley Conservation Authority appears to be better than on the Rideau.

The local limitations of growth indicate a need to establish tree plantations in the Authority for reasons of multiple-use, rather than for timber production alone.

## 2. Forest Utilization

Because a large forest area has obviously existed in the Authority throughout history, its utilization over periods of years has had a bearing on the use of landscapes, local industry and the incomes of local people. Within the last 15 years, the Authority, as part of the larger region of eastern Ontario, has experienced a number of variations in forest utilization. These include a gradual dropping of fuel wood production to just over 8,000 cords,



and a surge from under 2,600 cords of pulpwood from farms in 1951 to over 9,000 cords during the following decade.

A recent estimate of the forest products cut annually in the Authority serves to illustrate the current position.

<u>TABLE 11-2</u>				
<u>ANNUAL CUT OF FOREST PRODUCTS</u>				
	Hardwood		Softwood	
	Crown Lands	Private Lands	Crown Lands	Private Lands
Sawlogs	3,250,000fbm*	3,725,000fbm	570,000fbm	3,350,000fbm
Veneer	300,000fbm	275,000fbm		
Pulpwood	4,100 cords	2,850 cords	950 cords	2,350 cords
Ties		1,500 pcs.		
Posts, ) Poles, ) Fence ) Rails )				1,250,000 pcs.
* feet board measure				

A distinctly local feature of forest utilization is local investment in the extraction of essential oils from white cedar foliage. These oils are used for such products as medicinal preparations, veterinary ointments, oils, soaps and perfumes.

Production value is variable, depending on the quality of the raw material which yields between 0.6 to 1.0 per cent, or about one gallon of crude oil for one ton of foliage. This production has built-in high labour costs and a limited market outside of the Authority. The last public record of production indicated a national cedar oil production value of \$82,000 in 1964.

Leaves of open-growth exposed trees which are cut from February through March provide better raw material than does wood. Oils extracted from wood have less monetary value, though they are useful in insecticides and as floor and wood polishing material.

A recommended practice is that foliage be taken by partially cutting only from lower branches of selected 10- to 15-foot-high trees with the top three feet left untouched. Thus, growing foliage is maintained on the tree to allow it to grow to commercial size. It is of use for the Authority to note that such care has not taken place locally, and that permanently damaged over-cut trees are common in the cedar-cutting areas of the Authority.

SAWMILLING: Because of the major area of the forest resource in the Authority, the advantages of more local employment, and improved

individual income, lie in the improved management and exploitation of this resource. A clear picture of the sawmilling industry within the Authority, however, is difficult to get, since sawmill size, equipment and annual time of operation are variable. It is also quite possible to have mills in the Authority with current operations outside its boundaries and vice versa.

Additionally, reliable information regarding investment, actual volumes cut and delivered to mills and mill incomes has been difficult to get. Hence, it is only valid to discuss certain features of this industry for purposes of this report.

Most of the larger mills in the Authority's eastern region derive some raw materials from land of from 500 to 1,600 acres in area owned by the mill enterprise. Not all of these lands are totally forested. Some of the local mill owners buy such lands, remove the forest, and then sell the lands again.

Some logs are bought locally from farmers, with mill owners claiming that their hauling distance varies from 15 to 50 miles. Cedar post interests are prepared to haul up to 100 miles and one new mill owner is prepared to go the same distance for high quality sawlogs. In addition, cutting operations on Crown-owned lands are often part of local sawmill operations. Judging by interviews, and information from other agencies, total employment in sawmilling within the Authority averages below 150 men, including both permanent and part-time workers. This work force is mainly confined to larger mills. Automatic mill equipment will tend to reduce the required labour force. One of the larger mills reports its mill investment at \$250,000.

In the Authority's western region, 80 per cent of the sawmills operating in the region are small, generally having a milling capacity of up to 10,000 feet board measure per day. The remainder produce railroad ties, with one having an additional productive capacity of up to 50,000 feet board measure per day of sawn lumber. Most of these took logs mainly from private lands during the year of survey. Three mills received a total of 172,000 feet board measure from Crown lands.

### 3. Employment and Income in Primary and Related Processing Enterprises

The major forest industry product at present is hardwood, which is bought and milled locally, but which leaves the Authority area for markets some distance away, for final manufacture, usually into furniture. Employment and income therefore come from the primary producer within the Authority, not the higher income manufacturer.

Examination of the current state of secondary-wood-using-industries indicates that economic growth is not taking place with respect to employee numbers, wages and value of manufactured materials.

#### 4. Current and Projected Growth

Government sources primarily concerned with timber management feel that for some time the future of forest use within the Authority lies in its recreational potential, rather than its timber potential. There is also a growing trend of land purchasing by private individuals, moving into the general Authority area, from Ottawa and its environs. In most cases, these owners prefer their woodlots to remain in a preserved state with reforestation being periodically added. The influence and use of forest management under the auspices of The Woodlot Improvement Act, are likely to increase locally.

The Lanark Forest Products Co-operative is still in operation, although presently experiencing problems of marketing and surplus.

The present influence of pulp and paper industries is limited. Some agencies feel that this influence may increase, particularly if processors in south-eastern Ontario develop an ability to transport raw materials economically over greater distances than at present, or if a processing plant is established in the Authority region. Since some pulp and paper plants presently employ processes that utilize all wood species with the exception of cedar, the Authority is warned that over-cutting problems, such as exist elsewhere in south-eastern Ontario, can develop. This, in turn, can lead to deterioration of both local forests and landscapes.





## SOCIAL AND ECONOMIC DEVELOPMENT — PART 3

### SECTION 12

#### OUTDOOR RECREATION AND RELATED ACTIVITY

Recreation can play an important role in the economic and social development of a watershed.

The Mississippi Valley Conservation Authority offers a variety of potential for many types of outdoor recreation and to date only a few of these have been exploited (See Figure 12-1, Existing Recreation Facilities).

Recreation facilities are provided to a limited extent by both governmental and private agencies or individuals.

At the present time the government agencies and the facilities they provide for public recreation use include the following:

ONTARIO DEPARTMENT OF LANDS & FORESTS: This Department administers a number of areas in the Authority including:

- Provincial parks
- Fish and wildlife sanctuaries
- Crown land
- Canoe routes
- Hiking trails

The provincial parks are Fitzroy, Silver Lake, Black Lake and Bon Echo. These parks provide camping and trailer facilities for approximately 2,700 tents and trailers.

Approximately 20 water access points are maintained by the Department and are well dispersed throughout the watershed. Many more are planned. At some of these sites, such as the access to Mosque Lake, primitive camping is allowed. Fish and bird sanctuaries are maintained by the Department in the Authority. One well-known fish sanctuary is on the Mississippi River at Innisville and waterfowl are protected on McEwen Bay (Mud Lake).

Some canoe routes and hiking trails have been established, or are being planned by the Department, especially in the western end of the Authority, their focus being Bon Echo Provincial Park.

This Department is also responsible for the administration of large areas of Crown land found in the Authority (see Figure 21-1). Any development proposal by the Authority on these Crown lands would have to be made with the co-operation of the Department of Lands and Forests.

ONTARIO DEPARTMENT OF HIGHWAYS: As well as highway planning, building, and maintenance this Department operates many roadside pull-outs for picnic purposes. Most of these provide one or more picnic tables and refuse containers. Some are quite complete, providing tables,

fireplaces, waste disposal containers, and toilet facilities. At least one area (near Snow Road Station) includes boat launching facilities.

ONTARIO DEPARTMENT OF TOURISM AND INFORMATION:  
Although not directly involved in its operations, this Department has recognized the Mill of Kintail (The Tait McKenzie Memorial) as a Canadian Arts and Pioneer Museum.

Although not in the Authority, the Department operates Canadian-United States border Tourist Reception Centres that serve many visitors to the Authority, providing them with direction and information.

MUNICIPAL PARKS: Many municipalities have developed parks which vary greatly in quality and recreational facilities provided.

In a large number of the parks, the prime problem is one of maintenance. Many could be enhanced by a regular check and periodic thorough cleaning-up of refuse.

At the present time an Approved Park under The Parks Assistance Act is being developed at Sharbot Lake.

An Approved Park is one which has been approved by the Parks Integration Board and may be eligible for financial assistance from the Provincial Government. The Parks Assistance Act provides for a 50 per cent grant toward the total cost of land acquisition and development of the Approved Park. This grant cannot exceed \$100,000, of which not more than \$25,000 may be utilized for land acquisition.

As well as the above government agencies offering recreation facilities and services in the Authority, there are a number of privately-owned operations, too many to give a complete enumeration here.

These facilities include: campgrounds, marinas, private youth camps, and rental cottages, as well as fishing and tourist resorts or lodges and camps.

Most of the larger lakes with cottage development, and many of the smaller ones, have one or more marina facilities. For the most part, these operations offer a satisfactory range of services to meet the needs of the boating population.

A number of private campgrounds may be found in the Authority, some of which show a high potential for development and are well-run operations. Many, however, are poorly conceived and maintained. As these operations are very important to the overall economy of the Authority, steps should be taken to ensure that these facilities are operated on a quality basis.

In all, there are approximately 143 tourist resorts in the Mississippi Authority, providing accommodation for about 4,700 visitors.

Apart from cottaging, other outdoor recreation facilities are largely undeveloped in the Authority.





EXISTING  
RECREATION FACILITIES

LEGEND

- PROVINCIAL PARK
- YOUTH CAMP
- REC. ICE PARK
- GARBAGE DUMP
- MINES
- LAUNCHING SITE
- AIRPORT
- GOLF CLUB
- PRIVATE CAMPGROUND





Public access to water on Marble Lake.



Early stage of development of Mt. Pakenham ski hill.







A poorly planned campground. Note lack of cover and uphill location of outhouses.



A poorly maintained campground, typical of many in the Mississippi Authority.





At the present time there are few designated hiking trails and no scenic drives.

The high potential for canoe routes has not been developed except in the western end of the Authority where a few routes have been established by the Department of Lands and Forests or by private youth camps, such as Camp Mazinaw.

Winter recreation facilities including motor toboggan trails and ski trails — both cross-country and downhill — have been largely overlooked. A new ski area is being developed near Pakenham which should help meet the local as well as the Ottawa day-use demand for this type of activity.

In the Mississippi Valley Conservation Authority are a number of areas with a high potential for all of the above types of activities.

The fact that demand for these types of facilities is growing is well-known and need not be elaborated upon here\*. It is also a well-known fact that the majority of those persons demanding outdoor recreation facilities are urban dwellers. People are moving off farms into urban areas (see Table 9-2), and this rural-urban migration in eastern Ontario is higher than the provincial average. This, plus the expanding population in all areas, especially the regional urban population, will have a marked effect on the demand for recreational space in the Authority.

Many of the parks and facilities now in existence in the watershed are suffering from over-use, especially on holiday weekends.

The provision of a larger number of high quality recreation areas of various types, planned and developed as soon as possible, can help offset the current and future over-use of any one facility. In many instances, income generated by recreational expenditures by tourists could help offset those losses suffered by an area through off-farm migration.

The average vacation trip expenditure in eastern Ontario in 1966-67 was \$65<sup>+</sup>. It is difficult to ascertain what the future number of visits and volume of expenditures will be, but in 1965 more than 230,000 persons from the Metropolitan Toronto area alone visited eastern Ontario<sup>++</sup>.

Expenditures of this type can have a "multiplier effect" within the community; that is to say, a portion of the received tourist expenditures is immediately sent out of the area to pay for goods and services imported.

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\* The classic reference is M. Clawson, *Crisis in Outdoor Recreation*, American Forests, March and April 1959. See also: M. Clawson and J. Knetsch, *Economics of Outdoor Recreation*, Resources for the Future Incorporated, Johns Hopkins Press, Baltimore, 1966, pp.61ff.

<sup>+</sup> Gordon Lusty, *Study of Travel by Residents of Ontario*, Survey Research Limited, 1967.

<sup>++</sup> Dr. P. Klopchic, *An Analysis of Travel Habits and Expenditures of Metro Toronto Households*, April 1964-April 1965, Travel Research Branch, Ontario Department of Tourism and Information, Toronto, 1966.

Another portion is spent on locally-obtained goods and services. While each successive round of recipients receives less than the former, some of the original expenditure remains in the community. The tourist buys groceries, the grocer then pays his help who in turn buy other goods and services locally. This pattern of expenditure is known as the "multiplier effect" \*.

In the United States it has been found that "for every dollar spent in the country by recreationists, the total economic activity generated is found to be ... \$1.58 for tourists, and \$1.62 for summer home owners." + These figures will probably approximate the Canadian situation.

Thus, it can be seen that with a greater population seeking outdoor recreation facilities, and a greater number of high-quality facilities which the population will patronize, the economic impact on the Authority region will be significant.

The rural-urban migration is altering the social characteristics of the watershed. Some people are abandoning farms and moving to the urban areas, while others are farming part-time only. In the eastern sector of the watershed, many of the farms are being bought by people who work full-time in Ottawa and the farms are being taken out of production completely.

This urge to escape city living is becoming more and more noticeable. Many of the new owners do not want other people on their land and are posting their property against trespassing, thus removing the land from public use.

In many instances, the land is allowed to lie idle, or is leased. The leasing of agricultural land often gives rise to over-use of the land through poor management. Idle land does not necessarily have to be managed, but use could be made of some of this land for outdoor recreation facilities such as skidoo areas, or cross-country ski areas, or, where suitable, for upland bird and game areas. This is preferable to having the land removed from use altogether.

Opportunity exists here for private conservation practices to be put into effect.

The influx of cottages and the problems associated with them are also affecting the social and economic development of the Authority.

Thus, a wide range of outdoor recreation facilities can have a significant beneficial effect on the Mississippi Valley Conservation Authority, if the development is planned and controlled.

Facilities for recreational pursuits, be they active or passive, extensive or intensive, should be provided within the framework of a watershed plan and integrated with other resource planning both inside the Authority and with neighbouring jurisdictions.

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\* Clawson and Knetsch, op. cit. pp. 241-243.

+ Ibid. p.243.

Active recreation is that in which the participant exerts a noticeable effort, such as climbing or hiking, while much less energy is expended in passive pursuits such as driving for pleasure and viewing. Both active and passive activities may be intensive or extensive.

In general, intensive activities occur within a limited space and might be called "people-oriented", while extensive activities usually range over or cover a large area and may be "resource-oriented". In some cases, however, intensive activities such as bathing beaches are resource-oriented as well.

Some sites or areas are well suited for intensive use while others, because of fragile ecological communities they support, or because of unstable soils or easily polluted water, will permit extensive use only. This "carrying capacity" of an area is one important factor which must be considered in recreation area selection. In every case, it is vital that the environment be preserved. If a site is obviously over-used and is deteriorating, it will seriously affect the environmental quality of an area.

As noted above, the Mississippi Valley Conservation Authority has the physical base on which to establish outdoor recreation facilities and to maintain what is already in existence.

Recent behavioural studies have indicated that people cannot live in close proximity to one another without conflicts arising. This, coupled with the desire of urban dwellers to escape the city periodically, points to the need for outdoor rural recreational space. It is in the best interest of the community, the region, and even the country as a whole, if steps are taken to provide outdoor recreation opportunities for both present and future generations. The social well-being of our citizens may well depend on the existence of these opportunities, especially in future years.

Thus, by providing outdoor recreational facilities in the Mississippi Authority, many benefits both economic and social will accrue.

**COTTAGES:** The most common form of outdoor recreation in the Mississippi Valley Conservation Authority is cottaging.

For many years, cottagers, mainly from the north-eastern United States — New York and Pennsylvania in particular — have been establishing summer cottages on the lakes and rivers of the Mississippi Authority.

In the last few years the number of cottages built per year has increased.

Given an expanding urban population, a larger percentage of which is demanding outdoor recreation, and which also has increasing disposable income as well as more leisure time and improved transportation facilities, there is little likelihood that the demand for cottage property will decrease in the near future.

As indicated by the graph of rural seasonal electricity installations (see Appendix Figure 12-A1) cottage growth is increasing every year at an accelerated rate. While the figures given are not solely for the Mississippi



Valley Conservation Authority, they are indicative of the growth of the number of cottages in the region.

Already the shoreline of most of the major and many of the smaller lakes is ringed with cottage development.

On those lakes where crown land shoreline has been subdivided by the Department of Lands and Forests, 25 per cent of the shoreline has been retained for public access. Unfortunately, on those lakes such as Dalhousie, where the shoreline has been subdivided by individuals, no space has been left for common use.

In some instances, the local municipality has provided access points to lakes and rivers. Beckwith Township has provided at least two points of access at the ends of roads to Mississippi Lake, and Pakenham Township is planning a park and access to the Mississippi River, utilizing a portion of unused road allowance. Otherwise, as can be seen from Figure 12-2 (Cottage and Urban Development), very little suitable shoreline is available for future cottage development or public access to lakes. Steps should be taken now to preserve some of this shoreline for future development as well as portions to be left in its natural state.

Few regulations exist concerning the control of cottage subdivisions, or the type of building that may be erected. The Department of Lands and Forests sets minimum standards for buildings to be erected on the lots which it sells. Few, if any, of the member municipalities of the Authority have any form of cottage subdivision control. Steps to alleviate this problem are outlined elsewhere in this report. The result of this lack of control has been the establishment of many cottages of questionable quality, lining shorelines and engulfing the shore environment with a mediocre intrusion. Alternatives such as clustering should be investigated and controls effected, thus preserving a valuable and important environment and providing access for many to that environment.

The demand for cottage lots is having a serious effect on the price of shoreline. Already inferior shore property on Morris Island is being sold at an over-inflated price of \$30 per foot. In the last three years the price of questionable land on Bennett Lake has risen from \$6 to \$25 per foot. To the person selling the lot, this price probably seems fair in that he is charging the market price. However, as a result, the price of shore land is being unrealistically escalated. This has resulted in fewer and fewer people being able to afford their own private access to water. Therefore, steps should be taken to provide public access.

Aside from Mississippi Lake which has virtually reached complete development, there has been little cottage development along the Mississippi River from Carleton Place to Fitzroy Harbour. To preserve the scenic beauty of the river, as well as the ecological communities which this land supports, cottage development along this portion of the river should be discouraged.

Many municipalities feel that cottage development is beneficial, especially due to an increased tax base. What are often overlooked are the hidden costs involved such as providing and maintaining roads which cottagers demand, as well as the cost of avoiding the despoliation of the environment through various types of pollution.



PATTERNS OF RURAL-COTTAGE  
AND  
URBAN DEVELOPMENT

LEGEND

- RURAL DEVELOPMENT
- COTTAGE DEVELOPMENT
- URBAN DEVELOPMENT





While cottages are an important and integral aspect of the outdoor recreational opportunities existing in the Mississippi Valley Conservation Authority, steps should be taken to ensure that the carrying capacity of the lakes, streams and shorelines is not over-extended, that the natural environment is preserved as much as possible, and that the opportunity exists for many people to enjoy the benefits of this resource.



## SOCIAL AND ECONOMIC DEVELOPMENT — PART 3

### SECTION 13

#### RELATIONSHIP OF PRESENT ECONOMIC DEVELOPMENT AND WATER RESOURCE DEVELOPMENT

Water is abundant in the Mississippi watershed for various uses, e.g., agricultural, municipal, industrial and recreational. Since as early as 1816, the eastern townships of Beckwith, Drummond and Bathurst thrived around the river. The census of 1850-51 showed that each of eight townships in the eastern section had more than 2,500 inhabitants.

The area as a whole had enough water for "good mill seats" and hence attracted people to set up industries along the river. The construction of saw and grist mills was started as early as 1819. At Carleton Place, a grist mill was raised in 1820 and further industries followed. The forests were full of hardwoods, maple, beech, oak and basswood and the river transportation (the Mississippi and the Clyde) carried thousands of square feet of timber as well as logs to the south and the American market.

Since the early 1900s there have been several independent bodies managing the water resources of the rivers and streams in the Mississippi watershed. One such body is the Mississippi Improvement Company which holds a provincial charter. This company constructed several dams along the Mississippi River. While the original purpose of some of these dams was to provide transportation of timber, they were later adapted to store and to supply water for hydro-electric power. Some of these plants were located at High Falls, Carleton Place, Appleton, Almonte and Galetta. At present, however, power is only being generated at High Falls and Galetta by Ontario Hydro and at Almonte by the Almonte Public Utilities Commission.

Over the past years it can be said that water has played a significant role in the economic development of the watershed. The need is still there and hence water resource development is a key factor. Agricultural irrigation and livestock need water. The industrial demand for water for manufacturing and processing as well as hydro-electric power is evident. The municipal need for water in towns like Carleton Place and Almonte will increase with population increases. The demand for water for recreation has greatly increased recently due to the growing numbers of small craft owners and summer cottage residents who demand water suitable for swimming, fishing or other water sports. Development within the Mississippi watershed must therefore be co-ordinated systematically to take into consideration the various uses that can be made of the abundant water available. It is also evident that the facilities must be greatly expanded if they are to meet the demands of the future.





SECTION 14

FLOOD WATER DAMAGE

1. General Background

Within the Mississippi Watershed, floodwater damages are quite significant and have occurred for over 100 years. The history of flooding within the watershed is briefly described and an endeavour is made to highlight the flooding problems that arise on the Carp River drainage basin from its source to the village of Carp.

Both early and recent records of flooding within the Mississippi watershed describe the havoc caused in the area. Paraphrasing a few newspaper clippings, the flood damages are described as follows:

April 23, 1870; Globe (Toronto): Bridge on Mississippi river near Lanark carried away by floods. Woman loses her life while attempting to cross swollen river over pieces of timber laid across the river. Most bridges on the Mississippi and Clyde rivers have been carried away and the balance are expected to follow. Worst floods in 20 years.

April 29, 1870; Pakenham: River is considerably swollen and is very rapid near Pakenham. Three people drowned in a boat.

April 22, 1870; Globe (Toronto) at Almonte: Jam occurred on the river carrying away part of a bridge and seriously damaging another. The river is very high and continues to rise.

April 20, 1960; Ottawa Citizen; Lanark Special: Flood waters reached the highest level since 1947 and threaten to rise higher. The secondary road from Lanark to Almonte was closed to traffic and the Clyde River was within inches of breaking across the steel and concrete bridge near town. No serious danger of losses from rampaging river is envisaged but a few more inches could tell the tale, particularly in the downstream side of George Street where a second bridge is beginning to act as a dam with the clearance over the water reduced to nil. Several homeowners along the bank in this section of town are threatened. The sawmill of O. J. Rothwell has four feet of water in the yard. The river itself has a level three feet higher than any year on record since 1947.

April 28, 1960; Canadian (Carleton Place): Highest water levels in some years are being recorded this year as ice breaks up in the Mississippi lakes, resulting in a torrent of water passing Carleton Place. Last week the 11th Line Road was washed out. For weeks no traffic can get through. As a result fuel and food supplies are low and the people are experiencing great discomfort.

March 29, 1963; Ottawa Citizen: On the Mississippi River at Almonte, the community of Irishtown is experiencing its worst flooding in years. Damage is reported to three small bridges and some basements have been flooded.

April 11, 1963; Canadian (Carleton Place): In an article called "Echoes of the Past", Howard M. Brown wrote about the flooding on the Mississippi. For example, heavy spring freshets at the end of April 1885, were reported at Carleton Place. This level had not been recorded since 1870 when the Crotch (Cross) Lake Dam was carried away. The water washed out bridges and piers and did considerable damage to factories.

The dam at Cross Lake has given away a number of times. Greatest single loss of life on the river occurred when ten men were drowned in 1857 while engaged in repairing the dam. At the same time, a mill at the head of Dalhousie Lake as well as McIlquham's bridge were carried away by the freshet. Merrickville suffered also from the spring freshet.

Another great flood occurred in the spring of 1896 on the Mississippi. The bridge at McIlquham's was again washed out. Besides this, a great loss to property occurred.

Late floods of 1908 also did considerable damage at Carleton Place. In 1913 the new concrete dam of the River Improvement Company at Gull Lake (Clarendon) was blown open with dynamite and a reward of \$200 offered by the Government of Ontario for detection of the offenders.

As can be seen from above, proper watershed management to control damage from flood water is essential. Watershed control measures reduce runoff and correspondingly reduce soil loss from sheet, gully and stream-bank erosion. Flood water causes damage by inundation and by high velocities. Occasionally, sediment deposits may be beneficial to farm lands, though more frequently deposits of fine soil particles and sand have a damaging effect. Bridges, buildings, roads, farm lands and stream channels are often destroyed by flood waters having high velocities. Some of these damages may be classed as non-recurrent, depending on the nature of replacements and repairs. For example, a bridge replaced well above the high water level will probably not be in danger of subsequent damage. However, most damages, such as those from inundation and damage to land, are recurrent in nature.

Flood damages cannot always be prevented but they may be reduced by flood forecasting and by flood control measures. This is a socio-economic problem in which the protection of life and property, as well as the public welfare benefits, must be evaluated in balancing the annual savings from flood control against construction and maintenance costs. Aside from direct benefits to individuals and industries, there are public benefits such as economic stability and better social conditions.

## 2. Flood Water Damage in the Carp Area

Flooding along the course of the Carp River is more or less confined to the area from Hazeldean in the township of Goulbourn to a few miles north of, or downstream from, the village of Carp. In this section the river has a very gentle gradient for several miles (the average gradient for the entire river is 5.39 feet per mile), and two tributaries, namely the major south-west tributary and Poole Creek, empty into it. From its source to several miles downstream of the village of Carp, the capacity of the existing channel





Flood plains of the Carp River. Due to insufficient capacity of the existing channel, floods occur annually.



The flat flood plains of the Carp River watershed.



is approximately 700 to 800 c.f.s. \*. Any rainfall that produces flows in excess of 800 c.f.s. results in flooding in this general area.

Table 14-1 indicates the peak flows anticipated for various return periods.

TABLE 14-1 (See Fig. 14-A1)			
Return Period	Drainage Area (Sq. Mi.)	Estimated Peak Flow (Q) c.f.s.	Q in c.s.m.+
1 in 5 years	58.4	1,350	23.1
1 in 10 years	58.4	1,600	27.4
1 in 25 years	58.4	1,950	33.4
1 in 50 years	58.4	2,200	37.6

The drainage areas were calculated from 1:50,000 maps and the estimated peak flows are derived from synthetic hydrographs.

A typical cross-section of the Carp's flood plain in Huntley Township shows its flatness and indicates that a small rise in water level above the top of the channel bank would result in the inundation of large tracts of land within the flood plain. In view of the recent urban developments in the general area of Goulbourn Township, the Authority should determine the boundaries of the flood plain before any further expansion is permitted near the Carp River.

An attempt has also been made to project cumulative values of flood damages in dollars from annual flooding for the next 50 years on the Carp River between its source and the village of Carp. This is shown in the Appendix in 14-A2. The damages are plotted versus the drainage area of the Carp River in square miles. This curve represents the most common or annual flooding only. To estimate the damages for a larger scale flood such as the one that occurs once in 50 years or once in 100 years would require floodline mapping. The losses due to annual flood damage have been estimated by using the gross revenue of \$80 per crop acre. It has also been assumed that the present day prices of agricultural products would remain reasonably stable for the time period of this estimate. These conditions would yield \$960,000 as the total loss in 50 years in terms of cumulative dollars at six per cent interest. The flooded area has been assessed with the aid of interviews of long-time residents and through the study of aerial photographs and topographic maps.

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\* cubic feet per second

+ cubic feet per second per square mile





SECTION 15

EROSION DAMAGE

1. Soil Erosion

Soil erosion is the displacement of soil particles by water or wind. The degree of erosion is dependent upon many factors, some natural while others are due to man's activity and hence more controllable. The soil structure and porosity are important physical characteristics when the soil is subjected to heavy water runoffs or to blustering winds on exposed areas. Fine-particle soil is quite susceptible to displacement when subjected to the impact of rain-drops during heavy rainfalls. The topography and the degree of the slopes can also contribute to soil erosion.

Cover crops and tillage methods can play a significant role in the prevention of soil erosion problems. The presence of soil cover in the form of stubble or other plant material can reduce the erosive power of rainfall or runoff on cultivated fields during the fall. Tillage of fields modifies the soil structure. Constant cultivation of some soils alters the soil permeability and structure, eventually creating erosion hazards. Grain crops give the soil partial protection from erosion, while row crops only give comparable protection at their maximum development stages. Row crops provide no protection at soil preparation, planting and early growth stages. To reduce erosion hazards, crop rotations should be considered that include sod-forming crops, as this approach will assist in maintaining an aggregated porous structure as compared to the restricted porosity of soil that has been continually crop-cultivated.

The method of tillage can, if not properly executed, contribute to soil erosion by such means as cultivating up and down slopes, lack of maintaining field edges or the encroachment of ploughing along ditch slopes, gully or valley slopes. Lack of planning headlands upon the commencement of ploughing fields or the establishment of up-slope dead furrows are often the initial contributors to rilling and gulying on cultivated fields.

Little evidence of wind erosion was apparent. Stream-bank erosion of various types was observed and mapped during the survey. Bank erosion was mainly found east of the Precambrian Shield and was due in some instances to a combination of water-flow action and the grazing of livestock near watercourses. Generally, if improper cultivation procedures are carried out on fine-textured soil, rilling will increase. Rilling is a more concentrated form of sheet erosion. As the volume and velocity of the runoff waters increase, the cutting action within the rills eventually reaches a point where gulying becomes apparent.

Bank erosion is found where the soil is exposed and subjected to the erosion activity of flowing water in a stream. A fluctuating water level in the river can often leave rather extensive areas of exposed bank for further erosion activity. If the velocity of stream flow is relatively fast, a form of undercutting or slumping of the stream bank may result. Erosion of stream banks and slope erosion in pastures may be caused by the grazing of cattle.

Cattle may over-graze the thin grass cover on pasture slopes, exposing the soil and contributing to stream-bank erosion by the treading of stream banks to obtain drinking water. (See Figure 15-1 for locations of erosion along the various stream banks.)

Sheet erosion was not found to any great extent in the Mississippi Authority during the summer survey of 1968. However, if row cropping were to greatly increase, as is likely in the eastern segment of the Authority, then the incidence of sheet erosion could increase. During the survey, specific incidences of sheet erosion were observed in a tilled corn field in Fitzroy Township and along the steep valley sides of the Mississippi River between Almonte and Pakenham on Almonte silty loam.

## 2. Stream-bank Erosion

Stream-bank erosion is prevalent in various forms along numerous streams and rivers in the Mississippi Authority, but primarily in the eastern segment of the Authority. It should be noted that not only are these stream banks deteriorated, but the resulting deposition of bank material into adjacent waters can create silting and sedimentation problems.

Various forms of stream-bank erosion are as follows:

### a. Slumping:

The downward movement of stream-bank material due to the outward movement of material at the toe of the stream bank.

### b. Undercutting:

Undercutting the lower portion of a stream bank by a stream with the upper portion of the bank left intact in the form of an over-hanging cliff.

### c. Cattle Erosion:

Stream-bank collapse or displacement due to the treading of domestic stock along stream banks.

To eliminate or reduce the incidence of stream-bank erosion, methods of bank stabilization should be considered either by means of vegetation cover or mechanical structures along or on particular locations where bank erosion is evident or imminent.

## 3. Erosion Damage in Forested Areas and Farm Woodlots

### a. Sheet Erosion

Erosion can occur in forested areas, due mainly to agencies that cause the removal of protective litter-layers from the forest floor, or that reduce or remove vegetation living on the forest floor. This may be in the form of forest tree seedlings, ground vegetation species and shrubs. Such agencies include those that mechanically scarify the soils of the forest floor.





EROSION CONDITIONS  
AND  
REMEDIAL MEASURES

LEGEND

1. EROSION

2. REMEDIAL MEASURES

3. LOCATIONS OF DOCUMENTARY

4. RECORDS





Bank erosion in the Carp River watershed if unchecked will progressively wear away the land and add silt to the stream.



Improper cultivation practices in row crop production can lead to sheet erosion on fine textured soils.







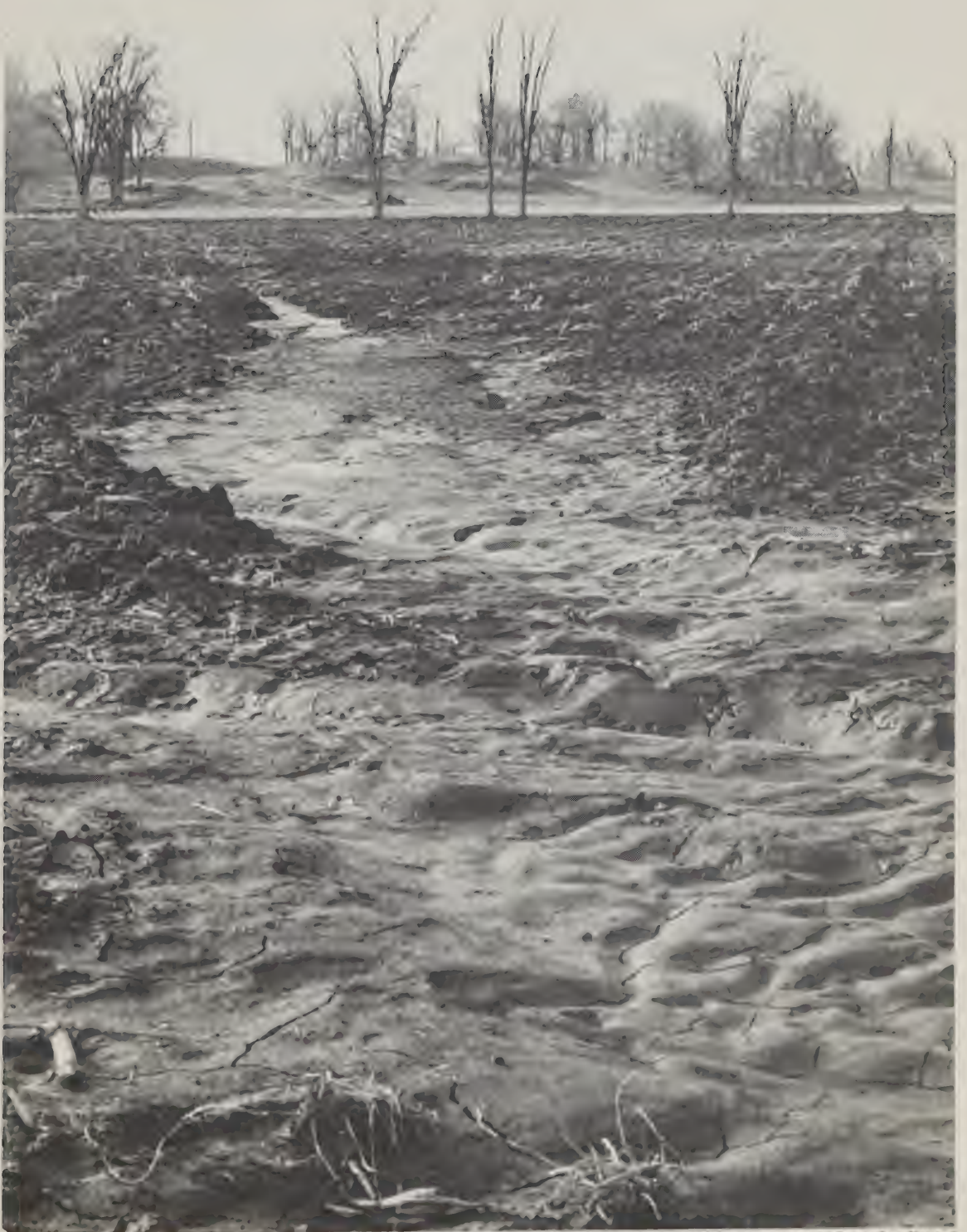
Overgrazing by cattle accompanied by stream bank erosion is quite prevalent in small tributary streams at the Authority's eastern segment.



The heavy use of river banks in the Pakenham area by cattle, has created the need for erosion control works.







Poor dead furrow location and lack of cover can increase sheet erosion problems on good agricultural land.



Sheet erosion is the normal result of removal of litter layers and vegetation from the forest floor and can be aggravated by increasing the amount of throughfall on the part of rain or sudden increases in snowmelt where these two elements of the forest floor do not exist.

In the upstream regions of the Authority, sheet erosion under undisturbed conditions in less accessible areas should be considered an unlikely problem, even in less densely stocked forest cover, since ground vegetation and litter layers in combination with existing forest tree regeneration are normally present and intact.

Elsewhere in any area that is settled, sheet erosion is probable, although soil losses from forested areas have not been recorded to date through careful site study or instrumentation.

The 1968 woodlot survey in townships of higher rural population and settlement shows that the practice of deliberate forest grazing as part of local pasture programs is a matter of constant habit. It is also in greater practice in the better agricultural areas where the soils are more erodible.

On the Precambrian Shield, the problem of over-grazing affects both forest lands and grass lands. Although the soils in this region are generally less erodible, there are at present indications that increases in grazing pressure are likely to occur through recent changes in livestock husbandry from dairy cattle to beef ranching. This can lead to increasing numbers of cattle in order to at least maintain incomes at the same level as that gained in dairy husbandry. Such an increase in stock will lead to increased grazing pressure on both grasslands and forest lands.

Woodland grazing has a slow-acting but direct effect on soil erosion. As litter is removed, the absorptive capacity of the top soil layers is reduced, and the exposed mineral soil of the forest floor becomes more prone to mechanical disturbance by precipitation and by logging equipment. As the forest gradually breaks down until it reaches the wooded pasture stage, the canopy of tree crowns opens up more and the erosive effects of rain over compacted soils forces overland water movement. The habit on the part of livestock to make trails increases this effect so that, as grazing continues, the whole destructive process is compounded.

b. Logging and Erosion

Logging, which is necessary to produce merchantable material such as sawlogs, pulpwood, post, and poles, has a number of effects on both forest and landscape.

When logging takes place, openings are created in forest and farm woodlots, which in turn allow increases of snow and rain to reach the ground. Runoff from these cut-over areas is therefore greater for an initial post-cut period of at least a year or two, until the vegetation and tree regeneration re-establish themselves.



As logging techniques have developed through time, increased mechanization of log extraction has meant that wheeled and tracked skidding tractors have tended to compound the problem of erosion and sedimentation on "bush roads", skid roads and yarding areas, particularly steep-graded sections. The effect of this erosion is multiplied in areas of shallow soil over bedrock. The total effect means not only turbidity and sedimentation in streams and lakes, but some losses of the soil as well.

Twenty recent logging operations in the Authority were examined to determine if potential erosion hazards and problems were to be found on local forest harvesting sites. These sites included potential reservoir areas selected by Conservation Authorities Branch staff conducting the water resources survey.

From the observations made, skidding cut material from material from woodlands with horses has resulted in the least erosion hazard, and in many cases, no apparent hazard at all. Such operations are usually small. One exception was found in a skid road on a steep up-slope location. The tendency for logging operations to locate extraction roads within 100 to 200 feet of streams and waterways evidently increases with the acquisition and use of farm tractors, four-wheel skidders and caterpillar tractors. Larger scale operations utilizing heavy equipment, habitually cross streams when skidding. Consequent damage to streambanks is noticeable.

Local operations still establish extraction roads up-slope or in draws. Staging areas, where loading takes place, have commonly been located in close proximity to streams, since convenience of operation is obviously considered before any possible detrimental effect on the waterway.

If examined as the logging takes place or shortly afterward, the effects of erosion are noticeable but variable as to the degree of downslope deposition or deposition within a watercourse itself. Of the sites examined, one cedar post, clear-cut operation had resulted in a skid road gullying directly into a small stream. Gullying had also occurred on one other haulroad surveyed during 1968. Occasionally the problem was compounded by the use of roads and woodlands by livestock, after cutting had taken place. It was not possible during the survey to trace the downstream effect with respect to sedimentation resulting from logging road erosion.

A similar erosion hazard is suspected in areas being developed for cottage sites. The relationship between forest harvesting and water quality, based on research results in both Canada and the United States, has been recently discussed in the Forestry Chronicle\*. Certain of the conclusions are applicable to the Mississippi Valley Conservation Authority.

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\* Jeffrey, W.W. Forest Harvesting and Water Management. The Forestry Chronicle, Vol. 44, No. 6, December, 1968.

On steeper slopes deleterious effects of tractor logging are enhanced. Quality of skid trail constructed is strongly correlated with sediment produced, poor skid roads yielding eight times the sediment of more rationally located tractor trails, even in the absence of major gullying.

The same information source considers that skid roads, haulroads and access roads are the main source of sedimentation from logged areas. The duration of sediment production appears strongly dependent upon the rate of revegetation. (Researchers in West Virginia have recommended the seeding of grass on permanent extraction roads.)

In the opinion of researchers, sediment production from logging can be minimized through presently available methods by adequate pre-logging planning.

#### 4. Windbreaks and Shelterbelts

Windbreaks or shelterbelts both provide a similar function; in essence they are wind barriers to reduce surface wind speed and usually consist of living plant material.

During the field survey, existing hedgerows were studied to determine how functional the hedgerows were in areas where small grains and corn were planted. The degree of lodging of field crops was not severe during the summer of 1968 in the Authority and it was evident that some hedgerows did provide sufficient wind-barriers. However, in many cases the condition of hedgerows has deteriorated considerably and will require some improvements. In some locations the hedgerows have actually created wind tunnels, hence new hedgerows will have to be planted due to the present trend of enlarging field crop areas and changes in cultivation practices.





# WATER AND RELATED LAND RESOURCE PROBLEMS — PART 4

## SECTION 16

### SEDIMENT DAMAGE

Sedimentation in the Mississippi Valley Conservation Authority has been a slow process and in most areas has not caused significant damage.

Sediment load in streams is derived from erosion from land, channel banks, and streambeds. The amount and size of the particles that constitute this load depend on many factors such as: soil types, land-use practices, runoff characteristics, and channel velocities.

Sedimentation was examined by means of photography produced in 1960 compared with 1968 air photos of the same area to determine if sedimentation was a continuing process at various locations. Patterns of sediment distribution were also studied.

Through this method, several sites were located at which some form of sedimentation could be suspected. Quantity measurements were not possible, hence the rate of sedimentation was not determined, although it is suggested that such studies are warranted at these locations. It should be noted that in some locations, sedimentation has occurred where construction of some sort has taken place which has altered the shoreline through the disturbance or dumping of granular material. Finer material can also be washed offshore by wave action or by undercurrents along the shoreline.

The locations selected from air photos are below.

TABLE 16-1	
AREAS OF POSSIBLE SEDIMENTATION	
Campbell Bay (Mazinaw Lake)	Eastern shoreline
Malcolm Lake (Clarendon Twp.)	At extreme ends of the lake
Mississagagon Lake (Barrie Twp.)	Eastern end of the lake
Mud Lake (Clarendon Twp.)	Sediment apparent on 1968 photos
Taylor Lake (Lanark Twp.)	Eastern end of the lake
Shaw Lake (Miller Twp.)	Mid-western segment of the lake
Clayton Lake (Lanark Twp.)	Sediment in the eastern segment
Dalhousie Lake (Dalhousie Twp.)	South and eastern shoreline
Murray Lake (Darling Twp.)	Western shoreline
Gillies Lake (Lanark Twp.)	North shoreline
McGowan Lake (S. Sherbrooke Twp.)	Sediment at west end of the lake
Wolfe Lake (S. Canonto Twp.)	Sediment at east end of the lake
Mississippi River (Dalhousie Twp.)	Outlet of Big Mud Lake
Mississippi River (Bathurst Twp.)	Build-up of sediment north of Fallbrook
Carp River (Huntley Twp.)	Sediment has been dredged
Indian River (Ramsay Twp.)	Sediment evident in 1968 photos at junction with Mississippi River

The most prominent example is the silting of the Carp River, where it has severely reduced channel capacities. This in turn retards the rate at which the surrounding farmland may be drained, with a consequent effect on land productivity and value.

No estimate was made of the annual loss due to silting as, in most cases, this is directly associated with and cannot be separated from losses due to flooding.

## WATER AND RELATED LAND RESOURCE PROBLEMS — PART 4

### SECTION 17

#### INADEQUATE LOCAL DRAINAGE

In numerous locations in the eastern segment of the Mississippi Authority where the better agricultural soils are located, many private land drainage systems will require some modifications.

One simple and effective measure to handle surplus surface water from crop fields is the use of grass waterways. Carefully constructed and properly maintained seeded waterways can provide some soil erosion control on sloping lands, regardless of the cropping systems. In addition to conserving soil, grass waterways facilitate traversing watercourses with farm tractors and implements.

Many of the open-sided ditches found in the Authority should be graded into gentler slopes and seeded to grass to prevent erosion and gully-ing. The following table lists areas which should be considered for the establishment of grass waterways. The listed areas conform to mapped locations in Figure 15-1.

TABLE 17-1	
AREAS REQUIRING WATERWAYS	
1)	The area north of Dunrobin (in Torbolton Twp.) in the vicinity of the intersections of County Roads 9 and 29.
2)	The area along County Road 5 in the vicinity of Cons. 9 and 10 of Fitzroy Twp.
3)	The area just north of the village of Kinburn.
4)	Areas near the mouth of Cody Creek and to the east of Cody Creek north of Panmure in Fitzroy Twp.
5)	The area east of Old Hwy. 17 in Cons. 5 and 6 of Huntley Twp. just north of the village of Carp.
6)	The area lying north of Corkery and south of Hwy. 44 in Huntley Twp.
7)	A large portion of the south-eastern part of Ramsay Twp., in particular the area on both sides of the Mississippi River between Appleton and Almonte.

Tile-drainage systems can also be utilized in those areas of the Authority where intensive crop production may be implemented. These more productive areas consist of Rideau clay, Renfrew clay, and Carp clay loam soils. During the summer of 1968 several fields were in the process of being tiled. However, many other locations should be considered for tile-drainage to improve the more productive type of soils.





SECTION 18

WATER SHORTAGES

1. Agriculture Crops, Livestock and Rural Domestic

The availability of water for agricultural purposes is dependent upon several physical factors such as: topography, drainage patterns of the watershed, soil conditions and the watercourses themselves.

Soil conditions and the depth to bedrock can affect the rate of runoff in terms of both surface and sub-surface movement of water. Topography and the pattern of streams traversing an area play a significant role in streamflows, as steep gradients and shallow bedrock accelerate runoff to create peak runoff periods. If the soil is not able to retard the movement of water, then high peaks of water yield result during the spring freshet with later re-charging dependent upon intermittent rainfalls. This situation of shallow soils and little water retention is apparent along the perimeter of the Ottawa Burnt Lands. Hence, water shortages for agricultural purposes during drought periods is a possibility.

The farmlands immediately adjacent to the Mississippi River or other major streams have a ready source of water for crop and livestock purposes with the major problem for some farm operators being the cost of pumping equipment. However, the lack of a constant and sufficient flow of water in some of the streams, especially during the summer months, may be a problem in the Carp River and Cody Creek watersheds. Areas with a potential for row crop production are in soils generally located adjacent to the Mississippi River. If a need for irrigation should arise, the Mississippi could possibly be considered as a source for irrigation water, providing the river water does not contain undesirable pollutants.

Farms in the area along the eastern perimeter of the Precambrian Shield have two sources of water. The streams that cross the Shield and meander through much of the glacial deposition along its front provide sufficient water for agricultural purposes. Also, the sub surface movement of water through much of the soil forms springs and charges water wells and farm ponds in these areas. Hence adequate water for rural domestic purposes as well as for livestock is available. The porosity of the soils in this area provides a form of check-valve on water movement on both streams and springs, thus balancing to a degree seasonal runoffs. Nevertheless, periodic re-charging by summer rainfalls is necessary in the area. Numerous lakes and kettle-holes, due to geological activity, provide natural water reservoir sites in many instances. The only problem here may be fluctuating levels in the lakes. Deficiencies of water supply for local agriculture do not seem apparent in the western segment of the Authority, while areas in the east segment, particularly those dependent on streams, may experience some problems in obtaining sufficient water in the future when municipal and industrial users increase their competition for water in the desired quantity and quality.

## 2. Municipal and Industrial Supply

The Mississippi Valley has a relatively abundant supply of water which is utilized for agriculture, municipal, industrial and recreational purposes.

The towns that need water for municipal use are Carleton Place and Almonte. Industrial users that require water are quite diversified and include water-operated saw and grist mills, woollen mills and cheese factories. Although the water supply for municipal and industrial purposes was not investigated in detail during the survey, no immediate shortages of supply were evident.

## 3. Recreation

Most types of outdoor recreation, especially those occurring during the summer months, take place on or near water, which provides cool breezes in warm weather as well as the opportunity to "cool-off" in the water. Most people find a view including water visually pleasing, and many have been lulled by the sound of water lapping at the shore or waves pounding on a beach. With regard to water shortage and its effect on recreation in the Mississippi Authority, few problem areas exist.

In Marble Lake, for example, the low water level creates some trouble for boaters from drowned tree stumps at the north end, but higher water might affect the fishing and cover a fine sand beach. Similarly, in Cross Lake the drawdown of as much as 12 feet annually causes some inconvenience to one resort owner, but would provide little trouble for day use if the area were left in an undeveloped state.

The Carp River system suffers from low summer flows which are a detriment to recreational use. The shore of this river is all Class 5 (Appendix, Figure 7-A1), and will therefore stand extensive use only. Small picnic areas, or possibly a hiking trail, could be established along its length.

Other streams such as the Clyde River between Hopetown and Kerr Lake experience periods of lowflow, but this is not serious enough to have an adverse effect on the recreation capability of the streams. If a facility such as a canoe route is established along this portion of the Clyde River and other areas of intermittent stream flow, it is important that users be made aware of the fact that at times, especially in late summer, some portaging will be required.



## WATER AND RELATED LAND RESOURCE PROBLEMS — PART 4

### SECTION 19

#### WATER POLLUTION

##### 1. Introduction

Pollution is considered to be anything that may impair the quality of the water of any well, lake, river, pond, spring, stream, reservoir, or other water or watercourse. It includes discharge of material of any kind to the water or depositing such material on the bank or shore of the water supply, not only those materials which may be injurious to health, but also those which might interfere with aquatic life, recreation, or any normal use of water.

One of the greatest hazards of water pollution is the risk of disease to a community. Polluted water may contain pathogenic organisms which are hard to detect. Coliform organisms, although not dangerous themselves, accompany the pathogens and are easily detected. For this reason, one of the standards of water quality is based on the coliform count. The Ontario Water Resources Commission recommends that no more than 2,400 coliforms per 100 millilitres (ml.) be tolerated in surface waters.

Foul-smelling and objectionable-looking water not only offends our sensibilities and our aesthetic and recreational enjoyment of the outdoors, but is usually devoid of desirable species of fish and wildlife. People are spending more and more time on recreation and, if benefits are to be reaped from the growing interest in outdoor recreation, natural facilities and sites must be conserved and protected from pollution.

##### 2. Biochemical Oxygen Demand, Coliform, Dissolved Oxygen Tests, Fertilizers and Pesticides

Samples were taken from the river at various locations during the period June 11 to September 10, 1968. Many samples have also been taken by the O.W.R.C. for many years.

The most useful measure of organic pollution (apart from coliform bacteria and other bacteria more harmful to human health) is the relation of the dissolved oxygen in the stream to the dissolved oxygen required to stabilize the waste through the action of bacteria on it. This measure is called the Biochemical Oxygen Demand (B.O.D.). The five-day B.O.D. at 20° centigrade is the commonly accepted standard of measurement of oxygen demand.

One of the objectives of the O.W.R.C. for surface water is a maximum B.O.D. of 4 p.p.m.\* The B.O.D. and coliform counts much exceeded the limits in several instances.

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\* parts per million

A test for dissolved oxygen reveals the amount of oxygen available to satisfy the B.O.D. The absence of oxygen will result in anaerobic conditions, with foul-smelling water and large quantities of fungi developing. The ability of water to hold oxygen in solution is small, ranging from 14.6 p.p.m. at 32° Fahrenheit, to 7.6 p.p.m. at 86° Fahrenheit. Therefore conditions are aggravated in polluted streams in summer when bacterial action takes place faster and the dissolved oxygen is low.

The amount of nitrates and phosphates which enter the river from chemical fertilizing and pesticides in agricultural operations is not known but it is considered to be small in the Mississippi Valley. The phosphates which are present are often the residues from cleaning compounds and wastes from cheese, milk and industrial plants. They are also present in all the present household detergents. High values of free ammonia and total Kjeldahl\* are an indication that the stream is freshly polluted, while the presence of nitrates and nitrites indicate that pollution has already occurred at some earlier stages and the compounds have been almost completely oxidized. In unpolluted waters the amount of ammonia and ammonium compounds (chiefly ammonium carbonate) is usually very small.

From the standpoint of aesthetics, large amounts of suspended solids are objectionable, whereas for domestic or industrial purposes dissolved solids are objectionable.

### 3. Sources

The sources of pollution in the Mississippi Valley include domestic and industrial wastes, whey from cheese factories, the effluents from dumps and laundromats, and the effect of cattle which use the various streams and pollute them.

Variations in sampling procedures and in the distribution of bacteria in water do not permit absolute judgment of the quality of a body of water based on a single sample. However it can be said that if the objectives of the O.W.R.C. are not met in any particular instance the water is known to be polluted.

#### a. Lanark

At the time of survey, a knitting mill and a laundromat were using the river for the source and discharge of water for industrial purposes. The Clyde River is used to some extent for bathing purposes within the village boundaries, but usually above these sources of pollution. Water from the Clyde River is used for non-drinking purposes in a few houses. Drinking water is obtained from wells.

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\* Kjeldahl values are derived by the conversion of as much organic matter in water as possible to ammonia, plus free ammonia in the water. They do not include nitrates or nitrites.

At the municipal storm sewer outfall discharging to the river, a characteristic sewage odour was noted at this outfall and it is presumed that some septic tanks must drain into it.

Sewage disposal is effected by septic tank systems. The problem is complicated by the very shallow soil overburden and numerous rock outcrops. Apparently some wells are affected by nearby septic tanks.

The outfalls from the knitting mill indicated a very high and excessive B. O. D. , a high concentration of suspended solids and a very high bacteriological content. Detergents, wool, and dye wastes also adversely affect the aesthetic qualities of the river.

Concerning the laundromat, the discharge of detergent wastes to a watercourse prior to adequate treatment is unsatisfactory.

At the Rothwell Lumber Company's sawmill sawdust wastes enter the Clyde River during periods of increased runoff. Allowing of deposits of this nature to gain access to a watercourse is a contravention of both The Ontario Water Resources Commission Act and The Lakes and Rivers Improvement Act.

The following table summarizes the situation when the river was examined by the O. W. R. C. in 1965.

TABLE 19-1		
CLYDE RIVER AND OUTFALLS IN THE VILLAGE OF LANARK		
Sampling Point	Coliforms per 100 ml.	5-Day B. O. D.
Knitting Mill — Detergent (Wash Discharge)	73,000,000	2,850
Storm Sewer from Hillier Street	500,000,000	42

Another comparison between the effluent of the knitting mill at Lanark, after initial dilution, with the water of the Mississippi River at the mouth of Dalhousie Lake (above the Clyde River entrance) was made from samples taken on August 1, 1968.

The results (expressed in parts per million) are as shown in Table 19-2.



TABLE 19-2

Location	5-Day B. O. D.	Solids		Phosphorous as PO <sub>4</sub>		Anionic Detergents as ABS
		Suspended	Dissolved	Total Sol.		
Lanark	66	10	976	0.60	0.55	0.7
Mississippi River (mouth of Dalhousie Lake )	1.4	27	97	0	0	0

b. Carleton Place

The O.W.R.C. reported on the situation at Carleton Place in 1966. Of the 13 principal industries, 12 were already connected to the municipal sewer system and no serious water pollution problems have been associated with these industries. Satisfactory bacteriological sample results were obtained from the river samples collected in the upstream section of the municipality. However, high coliform bacteria counts have occasionally been noted in this area due to summer cottages having inadequate private sewage disposal facilities. The municipal sewage treatment facilities (the Imhoff tank on Lorne Street and the septic tank on Rosamond Street) were the main sources of pollution in the municipality. The following pollution sources (amongst others) were noted in Carleton Place.

TABLE 19-3

Source	Coliforms per Ml.	B.O.D.
Storm sewer outfall to tailrace at Neelin Avenue	15,300	0.8
Municipal Imhoff Tank outfall to tailrace	46,000,000	60.0
Ditch outfall to tailrace at Lorne Street	216,000	2.2

Raw sewage was found to be in the effluent from one house on the north side of the river downstream from the dam.

c. Almonte

At the town of Almonte most of the wastes are treated by a very efficient series of stabilization ponds. The operation of these lagoons is directed by the Division of Plant Operations of the O.W.R.C., although the actual on-the-spot operation is managed by employees of the town of Almonte.

In the summer of 1968, there appeared to be a leak in the sewage pipe which runs across the bottom of the river to the lagoons west of town. There was a definite odour of sewage and cloudy water.



Pollution of the Clyde River at Lanark from an inefficient septic tank. This situation should be further investigated and a solution found.



Polluted water enters the Mississippi River here at Carleton Place. It is essential that a new treatment plant be built and connected to all effluents as soon as possible.





This cloudy water continues close to the eastern shore until it becomes partially dispersed opposite the textile mill.

On August 19, 1968, the textile mill had effluents from which wash water and dyeing water emptied directly into a channel under the building and thence into the Mississippi River. These liquids came through two pipes, one of which runs almost continuously while the other pipe empties at about 5-minute intervals. The liquid from one pipe reaches a temperature of from 150° to 200° Fahrenheit and occasionally only steam comes from the pipe. Blue dyes tinted the water at least 50 yards downstream. Algae were abundant at the outlet in the channel and downstream from the mill. The washroom facilities in the textile mill are not always used as on two occasions men were observed using the river as a sewer. An oil slick was observed downstream from the mill. This oil slick spread across the whole river surface.

In August, 1968, a coliform count in the Mississippi River below Almonte (Sample No. E and RM 9, Lab. No. 321313) was 8,200,000 per ml., but this was presumably taken at an area where pollution was either known or suspected from the odour of the water. The exact location was not specified on the sample bottle. It is not known whether the source of this pollution is Carleton Place or Almonte, but it is presumed to be from a source in Almonte.

At Almonte the Dairy Products plant has been releasing large quantities of polluted effluents into the Mississippi River. This matter is being dealt with by the O.W.R.C., which has given the plant alternatives of either treating its own wastes adequately or transferring them into the municipal sewer.

#### d. Cheese Factories

The disposal of whey from cheese factories is often a cause of serious pollution.

Because of its peculiar organic nature, all whey has a high B.O.D. If left standing for any length of time it becomes rank and high in odour as its acidity increases. It also becomes an ideal growth-medium for bacteria. Raw whey is therefore considered as a major pollutant and its disposal is receiving increasing attention from the O.W.R.C. In many of Ontario's smaller cheese factories, the disposal of whey, as well as wash water, is a cost that has never been fully recognized.

Whey can be given or sold to farmers either for food for hogs or as a soil fertilizer. If the whey is of a high quality, made and kept in stainless steel vats, it can be spray-dried or roller-dried, or delivered to a processing plant for use as lactose or lactalbumin, and later used for commercial production of alcohols, acids, riboflavin, yeast, and dried hog feed. However, the large and constant volumes required to make the processing of whey profitable do not apply to the

smaller cheese factories. The nearest drying plant in 1968 was at Cornwall. Four times as much whey is produced in Ontario in June, July and August as in the winter months. The cost of transportation is a very important factor. The smaller cheese factories cannot afford the capital involved in drying whey. Lagoons and spray irrigation are two systems of whey disposal approved by the O.W.R.C.

The survey party in 1968 examined four cheese factories at Balderston (Drummond Township), Kinburn (Fitzroy Township), the Boyd Settlement (Lanark Township), and at McCreary (Ramsay Township). Evidence of stream pollution was found at the first two.

e. Carp River

At the time of survey (July 25, 1968), there was pollution of a tributary of the Carp River from a new subdivision named Glencairn, south-west of Eagleson Corners, in Goulbourn Township. The subdivision's wastes are served by two sewage lagoons. Either the lagoons are too small or they do not operate properly, as gross pollution (which must originate from the subdivision) was in a tributary of the Carp River which passes behind the subdivision.

f. Pollution from Refuse Dump

On the south side of Highway 7, close to the intersection of Highway 509, on the bank of a small unnamed lake which drains into Sharbot Lake, is the large refuse dump of Oso Township. There appeared to be no attempt to cover the refuse, which is an eyesore to those people who drive along Highway 7. The effluent from the dump goes directly into the small lake, and from there into Sharbot Lake. This is a potential source of pollution, particularly in wet weather and in spring.

g. Aquatic Weeds

One council representative of Ramsay Township reported that aquatic weeds were being cut in the area below Carleton Place and that these were drifting down and causing a nuisance at Appleton.

h. Pollution from Cottages and Cattle

There is apparently serious pollution of the river and tributaries in many places from cottages and from cattle watering in the stream course. These practices cause a heavy demand for oxygen from the water, besides polluting the river bacterially.

A typical example is the Clyde River. Algae were found to be the dominant vegetation in the rapids in the Clyde River south of Brightside in Lanark Township. At one area, accessible by road from the Lanark-Brightside road, a large number of cottages have

been built along a half-mile stretch of the river. Below these cottages the water was cloudy and there was an increase of algae. There were several areas between Brightside and Hopetown where cattle were allowed to water in the river. Below each of these areas the algae increased.

Considerable quantities of floating masses of algae were found in the Clyde River near its mouth and some of these were also observed in the Mississippi River just below the confluence. This is evidence of gradual recovery from pollution.

i. Hopetown Sawmill

At the Hopetown sawmill, chips and sawdust were being deposited on the banks of the river. Sawdust tends to sink to the bottom of a stream, making the bottom sterile.

4. Monitoring Stations

At present there is only one monitoring station regularly examined for water quality on the Mississippi River. This is north-east of Galetta, and is very close to the mouth of the Mississippi.

The extremes of water of poor quality measured at this point are listed below.

TABLE 19-4		
	Extreme Condition	O. W. R. C. Objective
Coliforms per 100 ml. (August 2, 1967)	32,000	2,400 maximum
5-Day B. O. D.	2.6	4.0 maximum
	Parts per Million	
Solids (Total)	164.0	—
Suspended Solids	28.0	—
Phosphorous as PO <sub>4</sub>	.31	—
Free Ammonia	0.30	—
Kjeldahl Nitrogen	0.84	—
Nitrate	0.4	—
Dissolved Oxygen	4.0	4.0 minimum

The coliforms noted have been far above the maximum allowable for water for swimming (2,400), and may have exceeded the figure shown at many other times. The dissolved oxygen was measured as low as 4.0 parts



per million, which is the minimum recommended for aquatic life. This measurement was taken during the afternoon, but the oxygen content actually reaches its absolute minimum at about 4 a. m. when the maximum of oxygen is taken from the water by aquatic vegetation.

The figures shown for Galetta cannot be considered as representing the condition for the Mississippi River as a whole, as the dilution is very great at this point. Measurements taken above and below each major settlement on the river would give a clearer picture. The conditions shown are far from satisfactory.

At Galetta the water showed definite signs of gross pollution on August 19, 1968, as sewage clumps were floating on the water surface. There was also evidence of gradual recovery from pollution as there was a thick growth of algae on the river bottom. At a few points upstream from Galetta cattle watered in the stream, thus adding to the pollution.

Apart from an old garbage dump, on the west bank above the power dam, there were no signs of pollution from the village itself.

## 5. Additional Tests

### a. Chemical

Numerous additional chemical tests were made of the water of the Mississippi River by the survey party in 1968, using a Hach portable laboratory. These tests were confined to tests of the oxygen content of the water, the concentration of nitrates and nitrites, and the acidity of the water. None of these tests showed a very low oxygen content, the measured results varying from 6.0 parts per million to 9.0 parts per million. These are satisfactory conditions. The acidity, or pH, was found to vary from 6.3 near the effluent of the treatment plant at Carleton Place to 8.3 near the effluent from the textile plant at Almonte. These readings of pH are not considered significantly poor from the point of view of aquatic life, or other water uses.

The maximum concentration of nitrates plus nitrites found was 8.0 parts per million at Carleton Place, where the nitrates were 7.95 ppm and the nitrites 0.05 ppm. This represents a high concentration, and may be compared with the conditions at the east end of Dalhousie Lake, where no trace of nitrates or nitrites was found on July 9, 1968.

### b. Coliform

A random sample taken by the survey party from Dalhousie Lake gave a coliform count of 32 per ml. A second sample count at the east end of Dalhousie Lake showed a coliform count of 12 per ml. Several random samples taken from the Mississippi River at Lot 1, Concession V of Dalhousie Township gave counts which varied from 68 per ml. to 1,100 per ml. It seems probable that there are effluents from cottages in or below Dalhousie Lake which are unsatisfactory.

SECTION 20

RELATIONSHIP OF WATER AND RELATED LAND  
RESOURCE PROBLEMS TO THE IMPAIRMENT OF THE ENVIRONMENT

Many factors may degrade the landscape from an aesthetic or recreational point of view. They include unplanned or poorly planned building (particularly shoreline cottage development), and the pollution of water bodies due not only to the effluent of recreation developments (cottage and boat sewage, oil and gas discharge from outboard motors and the refuse from shore picnics), but also to excessive use—pressures on water bodies.

As a result of well-defined increases in demand (both expressed and latent) for recreational space, pressures on available resources are rapidly reaching levels which begin to destroy both the natural ecology of a site (in many instances, the very attributes which gave the site recreational capability) and the recreative element which more people are apparently seeking through outdoor recreation.

A mainly rural authority such as the Mississippi has the opportunity to ensure that development of its resources is controlled in such a way that its environmental attractions are not jeopardized. A most effective way of doing this is to make sure that there is integration of planning and that the systematic conflicts and relationships of any project are recognized. Most apparent is the necessity to co-ordinate plans for development of areas and recreational facilities so that the optimum spectrum of opportunities is provided and the environmental attractiveness of the Authority as a whole is placed on a sustained-yield basis.





# PRESENT AND FUTURE NEEDS AND POTENTIAL FOR WATER AND LAND RESOURCE DEVELOPMENT — PART 5

## SECTION 21

### NEEDS AND REMEDIAL MEASURES

#### 1. Watershed Protection and Management

The need for an active watershed and water resources management program is highlighted by the fact that several areas of the watershed have a long history of spring flooding and chronic water shortages during the summer months. In order to establish the policy of watershed management, the Authority should co-ordinate the objectives of various managing agencies to produce the best unified program.

In the past the development of the water resources has mainly been in the hands of the Mississippi River Improvement Company, the Ontario Hydro-Electric Power Commission and the Department of Lands and Forests. Besides these, several independent bodies have developed the water resources of a few tributary rivers and streams, mainly as power for small "run of the river" mills. Most of the development took place during the earlier industrial era of the watershed, when high voltage electric transmission lines were not common and communities had to rely on electric power generated locally. Similarly, the lumber industry used water for timber drives and the operation of sawmills. However, with the decline of this industry the water control structures built to provide water and power are no longer used to the same extent.

To maintain peak efficiency at its generation stations the Ontario Hydro has kept a comprehensive record of lake level fluctuations throughout the Mississippi Watershed. These records represent a good picture of the hydrologic events that have occurred. It may be noted that from 1939 to 1953 there was considerable fluctuation in lake levels, especially during the period of June to September, the peak tourist months. In the summer of 1941, Mazinaw lake level fell 2.7 feet which is equivalent to 10,600 acre-feet of water. Again in 1955 the lake level dropped 2.4 feet between June and November which amounts to 9,450 acre-feet of water. From 1956 to the present time the water level of Mazinaw Lake remained fairly constant (Appendix, Figure 21-A1).

Clarendon Lake, which has a surface area of 5,760 acres, is one particular example where an overall water management plan could be used to advantage. This lake has a small drainage basin and a large surface area. During the summer months there is very little water available for replenishment of evaporation and seepage losses. A diversion of excess runoff from another system to this lake would be desirable. The maximum loss observed on this lake occurred in 1941 and corresponds to a drop in lake level of three feet or a loss of 17,300 acre-feet of water. This is equivalent to a discharge of 50 cubic feet per second for 173 days (Appendix, Figure 21-A2).

Cross Lake, with its 4,410 acres of surface area, is used as a storage reservoir by Ontario Hydro to generate power at High Falls.

Records of water level variations at the outlet of Cross Lake have been maintained by Ontario Hydro since 1939. These records show that the maximum drawdown occurs between June and September and may lower the lake level by as much as 13 feet (Appendix, Figure 21-A3). A 12.3-foot drawdown in 1950 provided the High Falls generating station with 54,200 acre-feet of water. A constant discharge of 475 c.f.s. is needed to operate the High Falls generating station with 54,200 acre-feet of water. A constant discharge of 475 c.f.s. is needed to operate the High Falls power station at full capacity which equals 950 acre-feet per day drawdown on the Cross Lake reservoir. For 120 days this equals 114,000 acre-feet. The records show that this amount of water was not always available and hence the generating station at High Falls operated at less than 100 per cent capacity (Appendix, Figure 21-A4). While closer regulation is desirable for development of recreation it cannot be achieved successfully without additional water storage facilities capable of providing up to 50,000 acre-feet of water.

The dam at Carleton Place regulates the level of Mississippi Lake. This lake is the largest and one of the most important in the watershed in terms of recreation, having approximately 1,800 cottages along its shores. Since the dam lost its importance as a power dam, no major repairs appear to have been carried out and the structure has deteriorated. Fluctuations of lake levels reached a maximum of 3.3 feet in 1960 and a minimum of 0.5 feet in 1941 which corresponds to 24,700 and 3,740 acre-feet respectively. It is worth noting that 1960 was a year with severe spring flooding along the Mississippi River. Appendix Figure 21-A5 shows the water level fluctuations of Mississippi Lakes.

A more positive approach to watershed resources management is needed to assist in the achievement of a stable flow in streams, to ensure maximum water utilization and to conserve and protect the productive capacity of the Mississippi River basin soil resources.

Placement of gauges on various streams would be highly desirable and snow surveys would provide much needed data to forecast spring runoff values.

## 2. Flood Prevention and Water Conservation

The Mississippi River has a long history of flooding dating back to the 1870s. More often than not, today's flood damages are results of man's settling on the river's natural flood plain.

Flooding within the watershed occurs chiefly during the spring when the rapid melting of snow fills the lakes and the river channels are unable to convey the great quantities of water. There are no records of floods having taken place any other time than during the spring runoff. The control of snowmelt runoff therefore is the key to the prevention of damaging floods.

The present controlled storage capacity of the Mississippi system (excluding Mississippi Lake) is approximately 130,000 acre-feet. This represents storage in Mazinaw, Clarendon, Buck, Kashwakamak and Cross Lakes. Including Mississippi Lake the storage capacity could be raised to about 155,000 acre-feet. The purpose of these reservoirs is primarily to



store water for power generation (Mississippi Lake excluded) and the lakes are filled towards the end of the snowmelt period. If, during this period, a heavy rainfall should occur, the resulting flows would pass through already filled reservoirs unchecked and cause flooding.

a.     Reservoirs

In order to make the maximum use of the water available and to justify the high expenditures for reservoirs, it is necessary to make them multi-purpose in nature. The reservoir may satisfy any or all of the following:

- i.     Protect area against flooding,
- ii.    Store spring runoff for summer flows,
- iii.   Store water for fire protection, and
- iv.    Be used as a recreation area.

Several sites were investigated along the Mississippi Fall and Clyde systems and levels taken to check the topography of the areas. Due to the locations, the sites are suitable for constructing low weir-type dams. It should be noted that the designs suggested in this report are preliminary only as the foundation conditions were not investigated. A detailed analysis will be necessary before proceeding to final design.

If one or more lakes were developed as multi-purpose reservoirs they could be used to lessen the danger of flooding or, at least, reduce the magnitude of the floods. The strategic location of Clarendon Lake lends itself to this role very well. If some of the flood waters were diverted from the Mississippi River at Kashwakamak Lake, stored in Clarendon Lake and later released at some opportune time the magnitude of flooding could be reduced and the amount of water available for hydro power increased.

This project can be accomplished by excavating a channel from the public landing site number 2 on Kashwakamak Lake to Clarendon Lake and constructing a water control structure and bridge over the south access road. The use of Clarendon Lake as a storage reservoir combined with alert operation of the Carleton Place Dam could provide about 30,000 acre-feet of storage. The greatest known flood discharge measured at Appleton was 9,190 c.f.s. (50 years of records). This, in three days, is equivalent to about 55,000 acre-feet of runoff. Subtracting the flow of the Clyde and Fall Rivers, this would correspond to about 40,000 acre-feet from the upper Mississippi itself. The available storage in Clarendon Lake is 30,000 acre-feet, which could contain most of the flow resulting from large, infrequent runoffs. It is recommended that the Authority undertake a preliminary engineering study of the proposal to assess the costs involved and evaluate the resulting benefits.

The installation of a weir or a low dam at the outlet of Marble Lake would increase the storage capacity on the Mississippi River and also help to stabilize the lake level. Care would need to be taken



to keep the lake level within a suitable range during the summer period to protect the good sandy beaches for recreation purposes.

The repair of the dam at the outlet of Mazinaw Lake would also be desirable. At present there is considerable seepage under and around this rock-filled timber-crib dam, making it difficult to maintain a satisfactory water level. In August 1968 the seepage was estimated to be about 15 c.f.s.

A similar condition exists at the dam in Carleton Place. This structure, which controls the level of Mississippi Lake, is in need of repair to provide proper regulation of the discharge.

Flooding has been experienced along the Clyde River in the past, especially in the Lanark area. The dam at the former Lanark Veneer Mill which has been damaged by the high spring flows is in need of repair. Rehabilitation of this dam would assist the overall flood control program and provide a reliable source of water for fire-fighting purposes. It is recommended that a detailed engineering study be made to determine the extent of the necessary repairs.

Further regulation of the Clyde may be achieved by the erection of a low dam or a weir at the outlet of Joe's Lake, in the head-water regions. A small control structure, providing an additional 300 to 400 acre-feet of storage, would offer some flow regulation and help to maintain the water level on the lake during the summer period.

Similar flood prevention measures could be obtained by a low dam or a weir on the Fall River, just upstream from the village of Fallbrook, at the outlet of Bennett Lake. This structure would retard some of the spring runoff and reduce the large quantities of water reaching the Mississippi River downstream.

The three reservoirs listed in Table 21-1 would all provide low flow augmentation, recreation and some flood protection.

b. Flood Plain Lands

The Authority should outline the flood-prone areas to be designated as flood plain lands. These areas which, under normal conditions, will not be inundated by flood waters should be retained for agriculture, recreation or wildlife commensurate with the flood hazard. This applies particularly to some parts of the valley of the Carp River, within the townships of Huntley, Goulborn and March where there are no suitable reservoir sites to store the flood waters and reduce the flows to the capacities of the existing channels.

c. Flood Warning System

In addition to these control measures it is highly desirable to establish a workable flood warning system throughout the Mississippi Valley which would be alert to the potential flood conditions, co-ordinate the operation of the various dams and provide warnings to reduce the flood damages.



Dam site at the outlet of Marble Lake. Bed rock on the ground surface will provide a good foundation for a low dam.



Dam site at the outlet of Bennett Lake, downstream of the wooden bridge, would provide for low summer flow and some flood protection.



Dam site at the outlet of Joe Lake would be for augmentation similar to the structure proposed at Bennett Lake.







Dam site at Clayton on the Indian River being built by the Department of Public Works.



Dam at Carleton Place should be repaired to control seepage through and around the existing dam.





Mosque Lake provides a good potential reservoir site for the future development of the watershed.



Water can be stored in Antoine Lake to replenish summer flows on the Mississippi River if the need ever occurs in the future.





TABLE 21-1								
SUMMARY DAM AND RESERVOIR DATA								
Reservoir Site	Drainage Area Above Damsite Sq. Mi.	Height of Dam Ft.	Length of Dam Ft.	Maximum Depth of Water at Dam Ft.	Surface Area of Reservoir Acres	Additional Storage Ac-Ft.	Approximate Cost of Structure \$	Unit Cost per Acre-Foot \$
(i) Marble Lake	140.71	3	220	2	434	868	12,250	14.10
(ii) Bennett Lake (Fall River)	103.18	4	115	3	1,268	3,804	10,000	2.63
(iii) Joe's Lake	109.27	3.2	115	3	148	444	15,000	33.80

d. Ponds

The increased use of water for livestock and domestic purposes is evident and supplies once satisfactory are proving inadequate.

The average annual precipitation over the Mississippi Watershed and eastern Ontario is approximately 32 inches. This would be ample for most uses if the runoff from the precipitation in periods of excess could be stored to provide a supply when it is needed later in the year. One means of overcoming this seasonal deficiency is by constructing ponds.

Farm ponds provide water to meet the needs of livestock and domestic consumption and also provide a ready source of water for fire protection, recreation and aesthetic values. Swimming, skating, fishing and even boating can be made available. Also, with a little landscaping a pond can be a most attractive and pleasing addition to the farm community.

Farm ponds may provide suitable habitat for fish and wildlife. Tree and shrub growth along the banks will provide shelter for birds, animals and fish, which are valuable in the control of insects, provide game for hunting and fishing and are desirable simply because their presence does much to add interest to the countryside.

It must be borne in mind that a single pond cannot be adapted to serve all purposes and the main purpose must be specified and the pond designed with this idea in mind.

The smaller farm and community ponds play an important role in an overall water management program. The Authority should promote their construction either through direct technical and financial assistance or, where applicable, by advising the people of the assistance available through the Ontario Department of Agriculture.

e. Channel Improvements

Some degree of flood control and drainage improvement on the Carp River can be achieved by dredging the channel to increase its capacity. The cost of providing complete flood control would be prohibitive, but protection against minor floods and an improvement of the outlet for tile drains may be accomplished by a program of channel improvement for a length of eight miles from the confluence of tributary 'D' to two and one-half miles downstream of the village of Carp.

It is recommended that the channel be excavated to a depth of 10 feet with a bottom width of 20 feet and 1:1 side slopes. The details of this scheme are shown in the Appendix on Figure 21-A11.

The estimated cost of this work is \$275,000, or approximately \$34,500 per mile.



f. Ground Water

Subsurface water available for development within the Mississippi watershed was not fully explored. Some data are available through the Ontario Water Resources Commission but not sufficient to develop any meaningful conclusions.

Some ground water within the watershed has been developed for use through wells, springs or dugout ponds. Ninety per cent of the wells drilled were fresh water wells. Of these, most were carried to bedrock (91.6 per cent) and are used for domestic purposes (85.5 per cent).

3. Municipal and Industrial Supply

No problems were noted in the area of municipal and industrial water supply.

As the region develops more complex and diversified uses of water will emerge and therefore an awareness must be maintained of the necessity to supply an adequate amount of water for all uses.

4. Water Quality Control

If the present growth of cottages, industry and population continues on the Mississippi and its branches, the pollution load entering the lakes and rivers may make them useless for fish and wildlife as well as recreation and industrial use, unless proper controls are exercised. It is fortunate the river has near its source and in its course many lakes which dilute the effluents from cottages and in one case from industries. (The industries involved are at Lanark and the lake in this case is Mississippi Lake, but this is a very shallow lake.) However, the objective of the Conservation Authority should be to see that the lakes and rivers are cleared of any existing pollution and that they are then kept clean.

The following remedial measures are needed for water quality control.

It is recommended that the Conservation Authority assign to one of its advisory boards the function of seeing that regular samples are taken (if necessary by the Authority's staff) of the water above and below settlements and cottage developments, and submitted to the Ontario Water Resources Commission's laboratories for testing. The Conservation Authority would receive copies of the results of these tests and could refer back to the Commission any serious pollution for immediate action.

It is recommended that the Conservation Authority institute a wide-spread program of education of the public (including also municipalities and industries) concerning the aspects of public health, wildlife values and aesthetic advantages to be obtained by the reduction (and finally the elimination) of pollution in the Mississippi River and its tributaries and similarly in the Carp River and its tributaries.

It is recommended that the Conservation Authority urge the enforcement of proper standards for the disposal of wastes from the knitting mill at Lanark and from the laundromat in the same village. This may involve the production of a preliminary engineering report on the present situation in Lanark, which will also include ways and means of abolishing the effluents which now pollute the storm drain at Hillier Street in Lanark.

The outhouses built over the Clyde River at Lanark should be removed and the dumping of sawdust on the banks of the Clyde River at Hopetown and Lanark should be prohibited.

There are many places along the Mississippi River, and also on the Carp River, where the rivers are used for watering cattle. This inevitably causes pollution and alternative sources for watering such as ponds should be encouraged. Wherever possible, the fencing of streambanks should be encouraged also.

At the time of writing of this report the original plan for the building of a treatment plant by the Town of Carleton Place had been dropped. The Ontario Water Resources Commission therefore made preliminary plans to build a sewage treatment plant and to operate it, but the rate to be charged for treatment, based on a 40-year repayment of the cost of the plant, remained to be approved by the Town of Carleton Place. The project is now in the design and planning stages and, if both parties approve the proposed charges, it is possible that the plant might be in operation in 1970. This will make a radical change in the condition of the river below Carleton Place.

It is recommended that the Conservation Authority urge that the proposed new water treatment plant at Carleton Place be completed at the earliest possible date, and that all effluents other than uncontaminated cooling water must pass through the new treatment plant.

The effluents from the stove factory at Carleton Place, other than cooling water, and the effluent from the house on the north bank of the Mississippi River east of the dam should be connected to the municipal sewage system.

In the report prepared by the Ontario Water Resources Commission in 1966 it was recommended that all the wastes from the textile mill at Almonte be discharged into the municipal sanitary sewer system. The textile mill should take immediate steps to revise its method of industrial and sanitary waste disposal. The dairy products plant should ensure that there is no discharge of untreated industrial wastes (including wash water) from emergency outfalls. It is also recommended that care be taken to avoid any leak of raw sewage from either the municipal pumping stations or sewer mains.

The situation at the Balderston cheese factory should be investigated more closely and the owner of the cheese factory advised that the dumping of whey into a ditch or watercourse is contrary to the provisions of The Ontario Water Resources Commission Act.

The situation at the cheese factory at Kinburn should be investigated and proper measures for the disposal of its whey and washing wastes should be required.

When the regulations under Section 95a, item 18d of The Public Health Amendment Act, 1967, come into force, it is possible that the municipal dump at Highway 7 north of Sharbot Lake will be required to be covered with fill at least every two weeks, or the dump will be closed. Because of its proximity to Highway 7, one of the most heavily travelled roads in Ontario, this dump should be closed.

The leak into the Carp River from the sewage lagoon at the Glencairn subdivision in Goulborn Township should be investigated and corrected.

The Authority should urge that funds be made available for additional practical research on the use of whey.

## 5. Irrigation

Crop irrigation has not become a prominent feature in the eastern segment of the Authority where the lands with better agricultural capability are located. However, with increasing emphasis on row crops, a local demand for irrigation may occur.

At that time detailed studies will be required, particularly on the following points:

- a. Amount and distribution of annual precipitation in the area;
- b. Soil fertility, methods of cultivation;
- c. Manner of application of the water; and
- d. Source of the water to be supplied to the cultivated acreages, e.g. on the Carp, where stream flows are too low to supply irrigation water, an intensive development of farm ponds may be required.

## 6. Land Stabilization and Erosion Control

The need for land stabilization and erosion control in the Mississippi Valley Conservation Authority is of a type that requires specific definition and location in order to provide for proper conservation planning. Topographic features that influence erosion are degree of slope, length of slope, and size and shape of the watershed, e.g. on the steeper slopes of the Clyde River more potential exists for erosion than on the flatter slopes of the Carp River system. In the Carp area and elsewhere better land use is possible if erosion control is made effective.

The aims of erosion control are to eliminate the problem at its source by promoting techniques that prevent the movement of topsoil. The scope is broad and involves the fields of soil conservation, forestry and land utilization.

The Authority could further this objective within the watershed by implementing the following recommendations:



- a. Strong promotion and demonstration of contour tillage planting and harvesting;
- b. Strong promotion of strip-cropping methods;
- c. Promotion of the use of cross-slope channels (terraces) to carry the water off at reduced velocities, in any agricultural areas which experience major intensification of row-cropping;
- d. Promoting the planting of belts of trees or constructing other barriers for protection against wind erosion, in areas where this is a problem;
- e. Encouraging the use of crop residues either on the surface or incorporated in the topsoil;
- f. Promoting the minimum of tillage operations consistent with good weed control and seed-bed preparation;
- g. Establishing permanent vegetation in waterways in developed agricultural areas through education and an assistance program;
- h. Stabilizing gullies with suitable structures;
- i. Promoting the fencing of riverbanks where livestock are kept and the creation and use of off-stream water holes such as by-pass or run-off ponds; and
- j. Promoting proper logging practices.

## 7. Sediment Control

In the earlier part of the report it was noted that in the Mississippi Valley Conservation Authority, sedimentation has apparently been a slow process. Although no significant resultant damage has been observed and documented, it would be wise to encourage proper land-use practices to prevent excessive sediment damage in the lakes and rivers in the future.

## 8. Drainage Improvement

Of the 76,000 acres requiring improved drainage the major concentration is in the Carp Valley and in Carleton County, with considerable but more scattered areas in Lanark County. The pressure for tile drainage is not intensive as yet but will increase as the need for garden produce and other cash crops increases.

The Authority should publicize the increased production possible through tile drainage and the need to protect tile outlets to prevent erosion. At a later date, when the need becomes apparent, the Authority should consider a program of providing subsidies to promote increased use of tile drainage.









This is an example of good soil conservation near Dalhousie Lake. forested upper slopes, reforested marginal mid-slopes and improved hay pasture on arable lower slopes.



Forest grazing is causing the destruction of useful young tree seedlings and shrubs. This practice should be stopped.







Major logging roads established on slopes add to the erosion problem by providing an easier channel for run-off water.



Roads for small-scale logging should not be located along spring run-off channels.







Over-cutting of white cedar for boughs has left some stands in danger of heavy tree losses.



Marginal rocky pastures are generally unproductive in the Authority and should be reforested.



Many clearings in areas such as the "Burned Lands" should be left undisturbed to reforest naturally.





9. Associated Land Management and Adjustments

a. Reforestation

Necessary adjustments to forest cover for conservation purposes generally fall into three categories:

- i. Forest management to reduce any local soil losses and resultant unnecessary contributions to water bodies, particularly in the Authority's Precambrian Shield region;
- ii. The protection of both forested and cleared areas of limestone plain landscapes so that they may reforest naturally;
- iii. The reforestation of cleared submarginal areas, mainly on the Precambrian Shield, by establishing forest plantations in conjunction with natural regeneration. This method is designed to serve the need for wildlife habitat improvement as well as reforestation.

In the Mississippi area re-establishment of forest cover by individuals or by public agencies is necessary on a massive scale due to extensive clearing of a landscape that is basically marginal for agriculture. In the 16 townships of the Precambrian Shield section there are 120,910 acres of privately-owned land which would be better in public hands for forestry purposes and, in the 5 townships east of the Mississippi River, another 63,610 acres. It is suggested that the Authority commence a systematic program of land purchasing and, where the land acquisition is entirely for forestry purposes, that priority be given to properties in the Shield area.

This program may be greatly aided by private reforestation on estate holdings. The Authority should encourage such owners to take advantage of the Woodlands Improvement Program under the management of the Department of Lands and Forests.

b. Pasture Renovation

The utilization of Birdsfoot Trefoil for renovating pastures on rough land has displayed very favourable production results. The Authority should work with the local agricultural representatives to promote Trefoil seeding on suitable soils.

Since Birdsfoot Trefoil also has a wildlife value as cover for cottontail rabbits and Hungarian Partridge, the Authority should establish such cover on parts of areas which it might acquire, as in parts of Dalhousie Township, which are suitable for combined recreation, forestry and wildlife management.

10. Fish and Wildlife Developments

a. Fish

Many of the 257 lakes in the Mississippi Valley are already under management by the Department of Lands and Forests. For others to come under management there is a need for additional

information, such as the depth contours which have been supplied by the 1968 survey. On 17 of these lakes it is recommended that depth/temperature relations be determined in midsummer so that the possibilities for introducing lake trout, brook trout or bass can be determined.

As the proposed channel from Kashwakamak Lake to Clarendon Lake would result in more stable levels in both lakes, it is recommended that this proposal be supported as an aid to fish management. The only precaution needed is to assure that the level of Clarendon Lake not be drastically reduced during June, when bass are spawning.

The proposed weir on Fall River is recommended for improvement of fish habitat in Bennett Lake by maintaining late summer water levels. Stocking of this lake with walleye eggs should continue.

Samuel Lake should be considered for stocking with large-mouth bass and the creek which drains Buckshot Lake for introduction of bass or gravel-filled, bass spawning boxes.

Barbers Lake should be considered for brook trout stocking and Roberts Lake for brook trout or lake trout.

It is also recommended that some of the stumps be removed from Taylor Lake and the channel between Taylor Lake and Clayton Lake be widened to allow safer boat access for fishing.

Reduction in pollution, as recommended elsewhere in this report, will also improve conditions for fish.

The Authority should also support the completion and return to the Department of Lands and Forests of the Angling Questionnaires which supply valuable information for fish management.

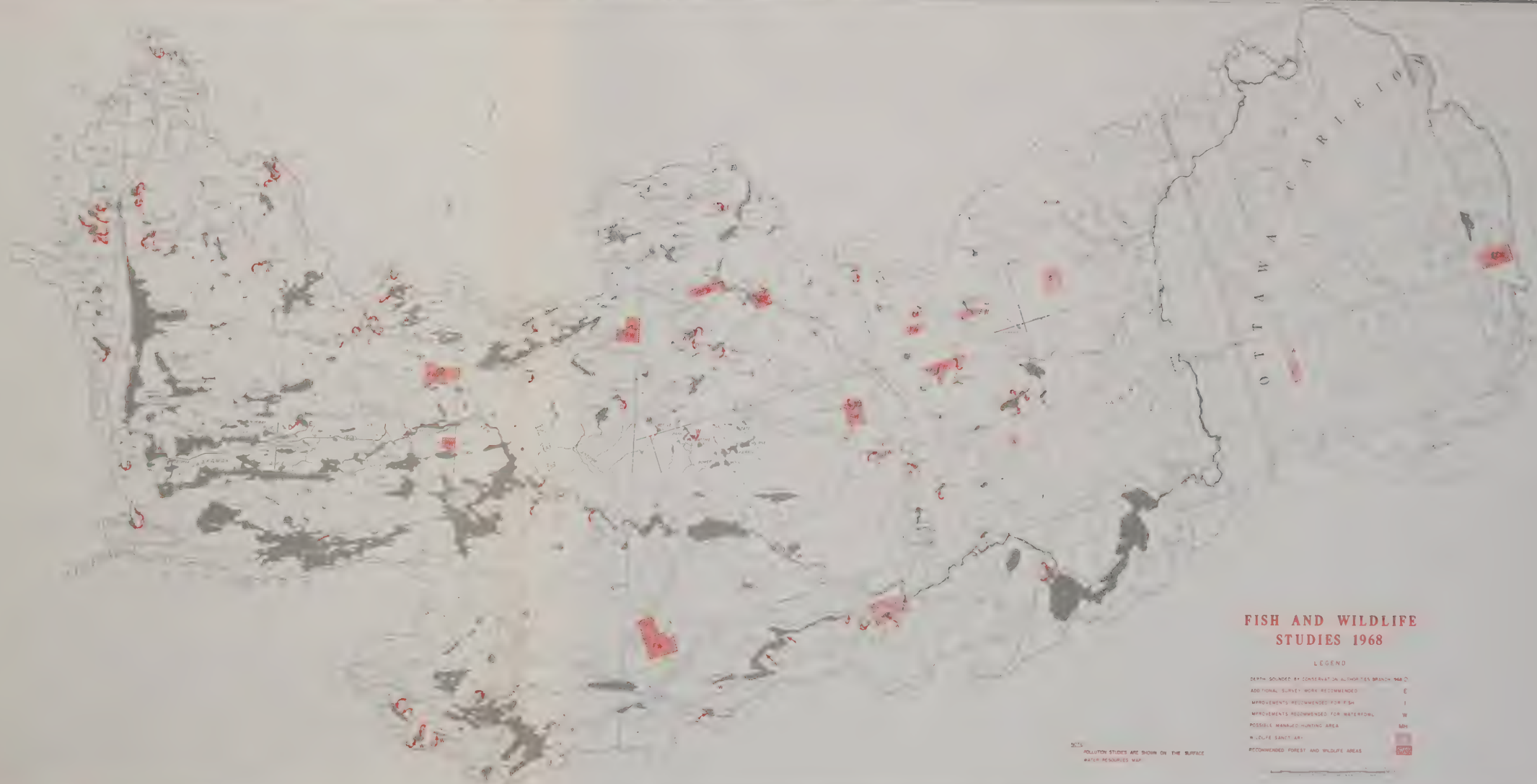
b. Deer Browse

The Authority should keep in mind the possibility of combining wildlife management with forestry. The purchase of marginal agricultural lands should be made with this in view and reforestation should be done in patches to provide desirable edge conditions. Such multi-purpose use should be a part of any management agreement.

Much of the existing forest is becoming too tall for deer browse. Thinning of hardwood stands can produce browse from coppice sprouts while at the same time increasing timber production from the remaining trees. Such methods should be practised on Authority land and encouraged on private lands.

c. Wildfowl

Although there is a considerable population of wild ducks breeding in the Mississippi Valley, and a much larger population of migrating ducks use it, conditions could be improved by four methods. These are as follows:



# FISH AND WILDLIFE STUDIES 1968

## LEGEND

- DEPTH SOUNDED BY CONSERVATION AUTHORITY MAP 148 D
- ADDITIONAL SURVEY WORK RECOMMENDED E
- IMPROVEMENTS RECOMMENDED FOR FISH I
- IMPROVEMENTS RECOMMENDED FOR WATERFOWL W
- POSSIBLE WILDLIFE HUNTING AREA MH
- WILDLIFE SANCTUARY
- RECOMMENDED FOREST AND WILDLIFE AREAS

NOTES  
HOLLISTON STUDIES ARE SHOWN ON THE SURFACE  
WATER RESOURCES MAP







- i. The introduction of certain aquatic plants in the places listed below;
- ii. The setting up of a large number of nesting boxes for Wood Ducks;
- iii. The installation of a small dam in Huntley Township, and the installation of a weir on the Fall River near Fallbrook; and
- iv. The blasting of certain Cattail marshes.

At Big Mud Lake, there was no Sago Pondweed, Wild Rice or Eel Grass (Vallisneria) present. These three species should be introduced. They are all available in nearby areas, or can be purchased.

McEwen Bay in Mississippi Lake is apparently recognized as a sanctuary by wildfowl, and a great many birds already use it. There is, however, neither Wild Rice nor Eel Grass (Vallisneria), in the bay. To keep this bay at its maximum potential, both species could be planted in it, although the Eel Grass would be experimental as it will grow well in an area as protected as this one is from wind.

Barr Lake now offers good waterfowl habitat, but the water is extremely shallow and there are large areas of dense Cattail marsh.

Two types of improvement are recommended:

- i. The use of ammonium-nitrate fuel oil mixture to blast many holes in the Cattail marsh and also in those areas of shallow water where the vegetation is too dense; and
- ii. The installation of Wood Duck nesting boxes in many areas of the lake. It would also be a useful plan to place Lemna Duckweed in several places in the lake. This is a species of special value to young Wood Ducks, and it would spread rapidly.

This area could be made into a managed wildfowl area as it has only one point of access by road, and if this is done the small lake to the south could be used as a refuge.

Most of Barr Lake is already Crown land.

There is a considerable area of solid Cattail at Horn and Little Lakes in Lanark Township. Islands could be blasted in these stands in the same manner as is recommended for Barr Lake.

Manion Corners Marsh is apparently very productive of wildfowl only in seasons of excessive early rainfall. As it is an area of little agricultural significance, it is recommended that a very low weir be considered for future installation at a suitable place on the north end of this marsh, to stabilize the summer water level.

The Wolves Grove area, with proper management, should give a good yield of both wildfowl and deer. The Conservation Authority should inquire as to the possibility of purchase by the

Department of Lands and Forests, but should consider purchasing part of this area itself if the Department of Lands and Forests has no plans for the area. There are many young maple saplings suitable for deer. Bowley Lake is within the area. Small dams on one or more of the streams would provide additional ponds suitable for bass.

**WEIR ON THE FALL RIVER:** The installation of a low weir on the Fall River should definitely have a good effect on the wildfowl potential of that river.

The full effect of this weir on wildfowl potential will not be realized for two or three years after the weir is installed.

**WOOD DUCK NESTING BOXES:** Trees suitable for Wood Duck nest holes are becoming scarce in the Mississippi Valley. Nesting boxes must be properly designed and placed in areas of suitable habitat to be effective. Details of both design and location are given at some length in the Appendix. It is recommended that the Authority use this information for the guidance of its own program and publicize it for the use of individuals or organizations interested in helping to increase these ducks.

**LOWER FALL RIVER HUNTING AREA:** The area including Lower Mud Lake and the lowest part of the Fall River is recommended as a Managed Hunting Area. The area could be enlarged westwards to include Upper Mud Lake and could also be increased northwards to include a part of the Mississippi River. Hunting pressure is now high, since 23 duck blinds were seen in the lower section of the Fall River. If the hunting on the area is to be managed, some part of the water area should be maintained as a refuge. A detailed map of this area is available to the Authority.

## 11. Recreational Development

In the implementation of recreation programs it is important that long-range goals are not sacrificed for short-term expediencies. As an aid to planning, the Authority should adopt a Conservation Area Classification and Zoning (see Appendix). In view of its restricted finances, the Authority should initially concentrate on land acquisition for open space using all available methods including lease-back arrangements, installment purchases and easements. In advance of development, design standards should be formulated which will be symbolic of the Authority. Structural materials should be vandal-proof, but of a high quality, and should blend well with the natural landscape.

Overall planning will require the establishment and maintenance of liaison with other agencies (such as the Department of Lands and Forests, the Eastern Ontario Development Council, Department of Highways, and neighbouring Authorities) to achieve a co-ordinated recreation system.

The Mississippi Valley Conservation Authority should strive to have member townships move ahead with Official Plans, subdivision controls, and zoning by-laws and further establish and co-ordinate municipal by-laws with



respect to dumping, filling, and other unsightly developments in order to maintain the natural beauty and environment of the watershed.

A training program for private campground operators to assist them with technical management and conservation problems would acquaint them with the attributes which lend high quality to the natural environment and to recreational enterprises.

The Authority should assist in liaison with private landowners in order to alleviate the problems associated with hunting and fishing on private lands and the development of easements for these purposes.

Trails and routes can be developed economically with a minimum of land purchase through the use of easements. Primarily, the Authority should consider the establishment of a marked canoe route along the Mississippi River and some of its tributaries. The Authority can help to designate a system of scenic roads by establishing, maintaining or enhancing the natural environment of the roadsides and the views obtainable from them through co-operation with township and county road commissions and the Department of Highways. These routes should cater to local residents as well as itinerant travellers.

The burgeoning popularity of hiking calls for the establishment of a system of hiking trails, in particular one that will serve the capital region, and that will also tie in with the trails planned or developed in neighbouring Authorities.

Trails and facilities can also be established for another mode of recreation, the use of motor toboggans, which is rapidly gaining in popularity. These areas could be used in the summer months as bridle paths as well as hiking trails.

To aid the user of these trails, routes, and facilities as well as to aid in public relations and advertising, the Authority should prepare, in booklet form, a self-guiding commentary, indicating floral and faunal features, interpretation of natural geological features, viewing points, stopping points, picnic areas, and campsites.

The following sites and routes were identified as the most suitable for recreational development of the type indicated. The only private uses in conservation areas should be concessions for specific services for public consumption, and these should be located in service zones in these areas. Private leases for cottage development are not recommended. Ownership was not investigated and these areas are not necessarily available to the Authority. The following resumé is divided into two major categories: a. potential conservation areas, and b. proposed scenic drives, canoe routes and hiking trails.

a.        Conservation Areas

SITE I — Galetta Pond: This small attractive pond below the dam at Galetta would provide a picturesque picnic area. Pollution of the Mississippi River at this point is a problem but if the pollution were overcome, the pond would make an excellent swimming pool.

There is a large expanse of gently rolling land to the east of the pond which would be suitable for picnicking or limited camping. Because of its small size this would have to be classed as a Class III area.

SITE II — Carp: This area north-east of the Village of Carp is heavily treed and hilly. It would be ideal for a motor toboggan course or route.

SITE III — Carp Falls: At this point a tributary of the Carp River flows over a small limestone outcropping, creating a small yet scenic waterfall. It has potential as a Class III area for picnicking.

SITE IV — Pakenham: On the east bank of the Mississippi River, this class III site is worthy of mention due to its proximity to the unique five-span bridge over the river. The Department of Highways provides a picnic area on the west bank of the river below the bridge. The Authority might consider a small campground and an interpretive plaque concerning the bridge on the east side of the river. The gently rolling landscape affords easy access for both boating and swimming.

SITE V — The Burnt Land: This area, burnt over a number of years ago, has a number of smaller, typical areas which could be utilized as Conservation Areas. A site can be easily chosen which would serve as a Class IV snowmobile area. Other uses such as hunting could be made of this area in the summer months.

SITE VI — Appleton: This narrow area on the east bank of the Mississippi River in the Village of Appleton affords a scenic view of the river as it flows over a series of rock outcrops as well as burnt-out mill ruins on an island in the centre of the river. This would be an attractive small Class III picnic area.

SITE VII — Brightside: This location just south of the Village of Brightside, located on the brow of the hill, commands an impressive view to the north-east and west, and could be developed as a scenic drive viewpoint and picnic area.

SITE VIII — Herron Mills: This is perhaps the most spectacular site in the watershed, consisting of approximately 450 acres of rolling, well-treed upland and roughly 1.5 miles of Clyde River, and having a complete water-powered mill on the banks of the river. The site is presently used as a private home and farm. This area is a complete historic site, including a sawmill, a grist mill, a shingle mill, a carding mill, school and three houses, all in varying states of repair. While outright purchase by the Authority at the present time is out of the question, steps should be taken to institute negotiations between the owner and such agencies as the Ontario Heritage Foundation. This area and the buildings on it should not be lost to a private individual purchaser. As well as an historic site, the area could easily support camping, swimming, fishing, limited canoeing and winter sports.





An inexpensive boat launching site.



Pakenham Bridge: a site worthy of preservation due to its unique construction.



The "Drowned Lands" above High Falls.







"The Sugar Shack": a site for Spring activities.



Beaver Dam on Pake Lake.



"Eagle Hills" provide landscape suitable for camping.





SITE IX — Fallbrook: This area was originally purchased by the owner as a potential park site. Located on the Mississippi River it affords easy boat and swimming access. The land above the river flood plain is well-treed and gently rolling and could be developed for camping and picnicking.

SITE X — Feldspar Quarry: To cater to the growing number of "rock hounds" and collectors this old quarry site is an ideal site for the collection of such minerals as feldspar, mica, pyrites and quartz.

SITE XI — Bartlett Bay on Bennett Lake: This well-treed area with bedrock outcroppings would make an ideal picnicking and camping area. Access from Concession XI of Bathurst is very easy and the land rises in such a manner as to give a pretty view of the south shore of Bennett Lake. Access to the lake is poor, but could be improved in a number of locations along the shore. This site could be developed as an excellent Class III area.

SITE XII — Fagan Lake: This lake which drains into the Fall River in South Sherbrooke Township is as yet relatively undeveloped. There are two rented cottages which are in marginal condition on the north shore and one fairly new private cottage at the south-west end of the lake. A small Class III area could be easily developed at this site.

SITE XIII — Drowned Land: This area, above the High Falls Generating Station, at the present time is in rather poor condition owing to the number of drowned stumps just off-shore. This Class III area could be developed as a fine swimming area. It would also tie into the scenic drive and canoe route proposed later in this report.

SITE XIV — Sugar Shack: This Class II site offers a high potential as a multi-use area. It would tie in with the scenic drive and hiking trails. It offers steep hills for skiing and skidoo trails could be laid through the area. These trails could be used for nature walks in the summer months. A small campground and picnic site could be established here. In addition, owing to the increasing popularity of maple syrup operations, the operation could be run as a public, spring-time event.

SITE XV — Gunn Creek Rapids: This site, south-east of Poland, is an abandoned farm. The old farm buildings, in good repair, are on the site. Gunn Creek has been dammed above the rapids, forming a small pond. The rapids are quite scenic. The site is easily accessible from the township sideroad and could be developed as a small Class III area.

SITE XVI — Peterson Creek Bridge: This site, while relatively inaccessible, would be useful as an overnight stopover, a picnic area, or for fishing on Peterson Creek. It would serve as a Class III area within Site XXV mentioned below.

SITE XVII — Lake Palmerston-Lake Canonto: Two areas exist on these lakes, one on the north shore, the other on the south shore. These would be Class II and III areas respectively.

SITE XVIII — Green Lake: This is a beautiful small lake which derives its name from its unusual colour. In the summer of 1968, the only development present was a small private campground at the south end of the lake, and one cottage overlooking the lake from the east shore escarpment. If the lands surrounding the lake and the area south of the lake were acquired, it would be a definite asset to the Authority. This could be developed as a Class II area offering winter sports, camping, swimming and picnicking.

SITE XIX — Marble Quarry: This quarry offers samples of marble to "rock hounds". Parts of the area would be suitable for off-highway picnics and could be a pull-off on the scenic drive outlined below.

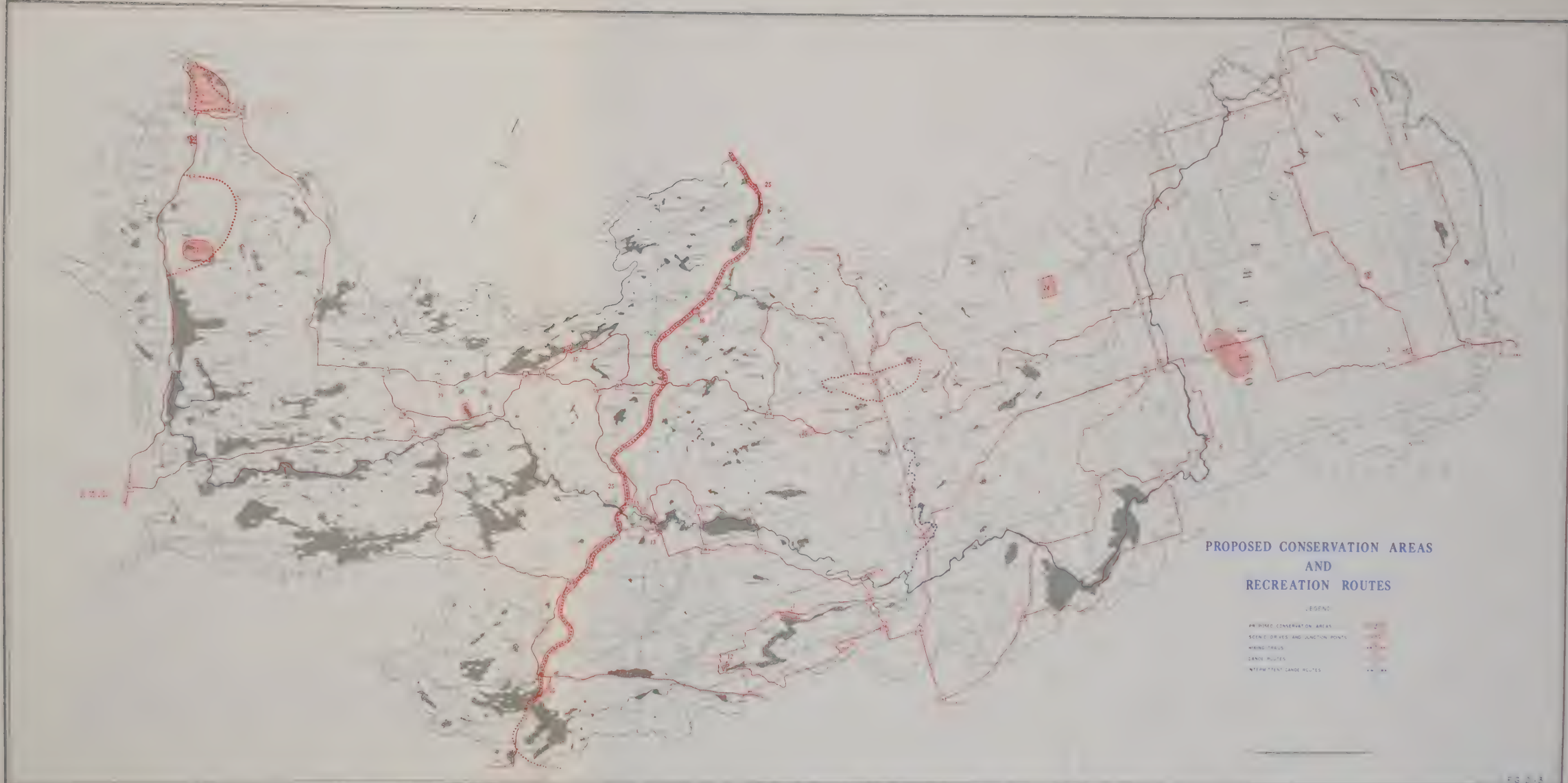
SITE XX — Kashwakamak Island: This island, although fairly large, would offer space for only approximately four campsites. It would primarily serve canoe trippers, as well as provide space for shore dinners by other users of the lake.

SITE XXI — Mallory Creek: This extensive marshy area, accessible only by canoe from Mallory Lake, would be a Class I area offering ideal waterfowl and beaver habitat observation. A hiking trail could pass through a small portion of this area.

SITE XXII — Pake Lake: This could be developed as a small Class II area off Highway 41. If the land surrounding the entire lake were acquired by the Authority, nature trails, picnicking and camping could be established on the sandy uplands on the south of the lake.

SITE XXIII — Eagle Hills: This area is one of the most extensive of its type in the watershed. It would make an ideal Class I natural area and the Authority should consider the possibility of acquiring control of as much of this area as possible. The potential of this area is great for hiking, camping, and nature study in all its forms. Fishing is available in its streams and lakes. In addition, large portions of the area or possibly the whole could be left as an undeveloped wilderness area. As the area encompasses the headwaters of the Mississippi River it could be the focal point in the Authority and could be used as a show place for the establishment, preservation and enhancement of the environment.

Outright purchase of the whole area may not be feasible, but easements, life-time options to purchase at death and lease-back arrangements, conducted over an extended period of time, would augment certain small key Authority holdings in the area and would give the Authority a long-term acquisition plan of a truly unique resource.



PROPOSED CONSERVATION AREAS  
AND  
RECREATION ROUTES

- LEGEND:
- |                                   |     |
|-----------------------------------|-----|
| PROPOSED CONSERVATION AREAS       | 2   |
| SCenic DRIVES AND JUNCTION POINTS | 100 |
| WINDING ROADS                     | 100 |
| SCenic ROUTES                     | 100 |
| WINTER/TEMPERATE CLIMATE ROUTES   | 100 |





SITE XXIV — The "Klondike": At least one area in Pakenham Township should be selected and acquired and kept in its natural state. This area comprising a parcel of land known as the "Klondike" has already been bought by an Ottawa resident with the express intention of it being left in its natural state. This is an area which includes cliffs, marsh, beaver meadow, fine mixed woods, stands of pine and part of Indian Creek enlarged into a very large pond by a natural dam. It is recommended that when this area eventually comes up for sale it should be purchased by the Conservation Authority. The area has already been visited by large groups of members of the Ottawa Field Naturalists.

It is also recommended that the Conservation Authority examine other areas in Pakenham Township which are now Crown land with a view to a more immediate purchase for the purposes mentioned above.

SITE XXV — Sharbot Lake — Calabogie Railroad: This portion of abandoned railroad right-of-way running from Sharbot Lake in a north-south direction through the watershed to Calabogie presents an ideal "corridor". From Sharbot Lake to Oso Station, the tracks and ties are still in place. From Oso Station to Calabogie, the tracks and ties have been removed. Portions of this section are presently used as a road. There are a number of marshy waterfowl areas along its route, as well as extensive upland game areas. This corridor would provide facilities for hiking, riding, cross-country skiing, skidooing, fishing, picnicking, walk-in camping, and unique natural areas. An extensive nature trail would be very easily established along its route. Rock outcroppings provide areas for rock collecting of Shield rock types.

The Authority is strongly urged to investigate the possibility of acquiring this railroad right-of-way, as well as old station and siding sites which could be utilized in a corridor concept development. This would make an ideal Class I natural area and could have scattered along it other Class II and Class III areas.

b. Scenic Drives and Routes

The routes shown on the map were chosen because of the type of scenery, topography and points of interest along their length. It is felt that these routes will provide a number of visual and educational experiences for driver and passengers. Nearly all types of roadways are covered. The routes are designated by numbered check points shown on the map.

ROUTE (1)-(2)-(4)-(3): This route covers the eastern sector of the watershed and affords views of the Ottawa Valley, agricultural areas, the Sand Hills on the Ottawa River, and scenic reaches of the Mississippi River, as well as the five-span bridge at Pakenham. A side-trip to the Mill of Kintail could be included. The Burnt Lands, a unique feature consisting of limestone plain with vegetation stunted by fire and poor growing conditions, as well as the headwaters of the

Carp River, also lie along this route. The route also passes by proposed conservation areas at Galetta, Pakenham and Carp.

ROUTE (2)-(3): This route follows the Carp River, affording views of the river and agricultural lands. It provides a route to the proposed conservation area at Carp.

ROUTE (5)-(8)-(7)-(33)-(6): Passes through Wolves Grove, an unusual biological community, consisting of heavy timber and marsh. (8) through (33) is known as the "Old Perth Road". The rapids and fish sanctuary at Innisville are interesting, especially in the spring when pickerel are netted by the Department of Lands and Forests and the eggs are harvested for future fish plantings elsewhere in the area. (33) to (6) follows in part the Mississippi Lake, affording views of the lake and shoreline.

ROUTE (8)-(9)-(10)-(11)-(12)-(4)-(5): Passes through marshy and forested lowlands and rocky hilly upland areas. Fine views are available looking northward from the stretch north of the Village of Brightside as well as the site of the proposed conservation area here.

ROUTE (13)-(14)-(9)-(10)-(11)-(12) to Calabogie: Highway 511 runs from Perth to Calabogie, is paved, and is very narrow and winding. A quiet drive through forested uplands with a side trip to view Herron Mills, a proposed conservation area.

ROUTE (11)-(24)-(10): Follows the Clyde River to Gordon Rapids. Affords views of the lakes, rivers and forested uplands.

ROUTE (9)-(10)-(24)-(23)-(22)-(21)-(18)-(16)-(15)-(34)-(35)-(14): This is a longish trip passing through the edge of the Precambrian Shield. It affords views of Robertson Lake and its islands, forested uplands, and passes over Gunn Creek, site of a proposed conservation area. The stretch from (35) through (14) to (9) crosses three major rivers in the watershed, namely the Fall, Clyde and Mississippi.

CIRCLE (18)-(19)-(20)-(21): A scenic route affording views of the Mississippi River, rapids, cottages, hilly topography, rock outcroppings, and a portion of the abandoned railway. Provides access to a proposed conservation area at the "Sugar Shack".

CIRCLE (16)-(17)-(18): A drive through steeply rolling, well-forested topography with a short side trip to High Falls Generating Station and views of Lake Dalhousie. The drowned area west of the lake behind High Falls Dam has been proposed as a conservation area.

CIRCLE (15)-(17)-(16): Around Lake Dalhousie. Affords views of the lake with a side trip to the High Falls Generating Station.



CIRCLE (23)-(25)-(22): Views of rock outcropping, forested areas, Lakes Canonto, Palmerston and Turcott; proposed Conservation Areas Lake Canonto and Palmerston.

ROUTE (20)-(21)-(22)-(25)-(26)-(27)-(29)-(30): Through Shield topography and scenery; through Ompah and Plevna; passes proposed Marble Quarry Conservation Area; views of Malcolm, Coxvale, Clarendon and Cross Lakes; coniferous and deciduous forests.

ROUTE (26)-(28): Past Green Lake, unusual because of its beautiful natural colour; a proposed Conservation Area.

ROUTE (13)-(14)-(15)-(16)-(19)-(20)-(30): Through margin of Shield topography; rock outcroppings; views of Silver Lake, McGowan Lake.

ROUTE (29)-(28)-(27)-(31)-(32): The longest and most scenic "circle"; passes over typical Shield topography offering views of many lakes, especially Mazinaw and Mississagagon; some longer stretches with no facilities for the motorist, nor inhabitants; fine forest stands; provides access to the proposed Eagle Hills Natural Area, Pake Lake Conservation Area, and Mallory Creek Wildlife Area.

c. Canoe Routes

The most obvious natural feature of the Mississippi Valley Conservation Authority is the Mississippi River itself. Serious consideration should be given to the establishment of a canoe route along its length, providing overnight campsites, cleared portages, and picnic sites. Other routes are also outlined below.

CANOE ROUTE 1 - Mississippi River - Lake Mazinaw to Fitzroy Harbour: From the village of Bon Echo on Lake Mazinaw to the south end of the lake; a short portage over a control dam is required here; a campsite has also been established at this site through Marble Lake (a Department of Lands and Forests access point is located on the south-west shore of the lake suitable for picnics and shore dinners) — a short portage is required into George Lake and again into Kashwakamak Lake. A large island in this lake has been proposed as a Conservation Area and could support a number of campsites and shore dinner facilities. From Kashwakamak a short portage is required to the Mississippi River; a campsite is available at the village of Ardoch. The route continues east along the Mississippi River then south, over a portage of approximately three-quarters of a mile in length into Cross Lake. The route continues over a dam and into Kings Lake. The stretch of river from Kings Lake to Miller Lake should be portaged by all but expert canoeists as the rapids here are ragged and dangerous. This area is very rough and some portage clearing is required. The river from Miller Lake to High Falls head pond (a distance of approximately one mile), requires a number of carry-overs. It is advisable to portage the whole distance. Another half-mile portage is required over High

Falls Dam and into Lake Dalhousie. From Lake Dalhousie the route continues to Playfair and on to the "Log Cabin Camp" about two miles west of Ferguson Falls. Some carry-overs and portages are required along this stretch of the river, and the next, into Lake Mississippi.

It is necessary to portage over the dams at Carleton Place and some of the rapids on both sides of Glen Island. A campsite has been established on the south-east shore of Glen Island. Except for portages at Appleton, Almonte, Blakeney and Galetta, the river from Glen Island is deep and quietly flowing.

This is approximately a ten-day trip.

CANOE ROUTE 2 — Hopetown to Lanark: This route has been called intermittent in that it is difficult, but not impossible, to paddle this stretch of the river in August due to low water levels. One portage is required over the dam at Herron Mills. The route passes through some scenic farmland and forest. There are a number of rapids which should be navigated with care, or carried-over, if the canoeist is in doubt.

A leisurely trip here takes approximately five hours to complete.

CANOE ROUTE 3 — Mazinaw Lake to Kishkebus Lake: Start from Bon Echo Provincial Park on Highway 41 and move south in Mazinaw Lake about two and one-half miles to a deep bay on the east shore. Portage over the dam into the channel leading to Semicircle Lake. Continue easterly through Semicircle Lake to the channel from Shabomeka Lake. Portage over the dam into Shabomeka Lake and move north-west through this lake to the portage leading to Kishkebus Lake. This portage is about 250 yards long but very easy. Return by the same route.

This route has a total distance of about seven and one-half miles one way, and the time required would be approximately four hours for this distance.

Kishkebus Lake is a wilderness lake — no cottages exist around its perimeter. The shoreline is rough, hilly and heavily wooded.

Only two areas can be considered satisfactory for camping purposes: one is at a small point on the north-east shore midway down the length; the other is at the north-east end of the lake where a sandy beach allows good swimming.

This route is good for the novice, because the distance is not long and portaging experience is valuable.

Both on this and Route 1, the canoeist should view the Indian paintings on Bon Echo Rock. These paintings are about four feet above water level and although quite faint are easily seen.

d.     Hiking Trails

To cater to this rapidly growing form of outdoor recreation, planning by the Authority should be instituted immediately in establishing a network of trail systems.

The following routes are suggested as a framework on which to build further trail systems.

TRAIL 1 — Eagle Hills: A trail system through this proposed Conservation Area could be very easily established, in that there are a number of grown-over logging trails already in existence. These trails would provide access to some of the remote lakes in the area as well as through some typical Shield country.

TRAIL 2 — Mallory Creek: This trail, over rock outcrop, provides access to a large waterfowl habitat and marsh area around Mallory Lake. Again, most of the trail traverses hilly, rocky upland and follows, in part, existing logging trails.

TRAIL 3 — Bow Lake to Lammermoor: This trail provides a walking route through a dense forest atmosphere, as well as some straight-away road walking. The stretch from Highway 511 to Lammermoor follows an unused, grown-over road allowance and gives access to marsh land and upland habitats.

TRAIL 4 — Sharbot Lake to Mile Lake: This trail, the longest and most spectacular in the watershed, would follow the abandoned railroad right-of-way from Sharbot Lake to Mile Lake. In the opposite direction, south of Sharbot Lake, the trail would veer to the east and connect with a trail proposed in the Rideau Authority. These trails would join at Attewell Lake.

The trail could also be extended north from Mile Lake to the village of Calabogie and tie in with other, more northerly trails here.

Facilities for hikers could be easily established along this trail at Sharbot Lake and at the other settlements along the route as well as at the proposed Peterson Creek Conservation Area. Picnic facilities and limited walk-in campsites could be established on the shores of Mile Lake. This route is used very little now and attempts should be made to secure all or part of the right-of-way for recreational purposes rather than converting it to a township or county road, which would receive, at best, only limited use. The whole of the railroad right-of-way has been proposed as a conservation area.





# PRESENT AND FUTURE NEEDS AND POTENTIAL FOR WATER AND LAND RESOURCE DEVELOPMENT — PART 5

## SECTION 22

### LAND RESOURCE AVAILABILITY

Any remedial measures undertaken by the Authority will have to consider the varied interests of resident and non-resident landowners, in addition to the physical capabilities of the various soils found within the Authority. In particular the following items will require consideration.

1. The lands closest to Ottawa will be under pressure for urban development and the resultant high land values will remove these lands from agriculture and forestry.
2. Beyond this area in the eastern sector there are sufficient soils of high capability for agriculture to provide for anticipated increase in market garden or other cash crops, but some of the lands will require tile drainage to develop their maximum production.
3. If agriculture is to continue in the western sector it will be mainly in the nature of beef farming operations which will require large acreages due to the limited areas of high-capability soils. Since many of the present farmers are middle-aged they may be reluctant to branch out in new enterprises and many farms will eventually be retired from agriculture.
4. The demand by non-residents for rural retreats and private recreation areas affects land prices. Apart from cottage sites, this demand affects particularly farmland holdings with some open areas and possibly some buildings. Much of the undeveloped land is less affected and will still be available for public projects at reasonable prices.
5. Apart from areas subject to severe urban pressure the following figures from 1967-68 appraisals may be considered indicative of market prices in the area.
  - a. \$100/acre for cultivated land of Class 1 to 4 Agricultural Capability in the eastern segment of the Authority; and \$60/acre for cultivated farmland on the Precambrian Shield.
  - b. \$20-\$30/acre for uncultivated land or wooded pastures; while forested areas in Lanark and Frontenac Counties were listed between \$15 and \$20/acre.





SECTION 23

PURPOSE OF THE PLAN

In order to solve as many as possible of the problems presented and implement the recommendations of this report without delay but within the financial competence of the participating municipalities it is necessary to adopt a Conservation Plan. This plan is intended to achieve a number of objectives:

- (1) To define Authority policy so as to serve as a guide to the Authority in exercising its powers under The Conservation Authorities Act, 1968.
- (2) To provide for the orderly implementation of measures to ensure the maximum benefit to society of the land, forest, water, wildlife and recreational assets of the Mississippi Valley.
- (3) To provide a basic framework within which more detailed conservation planning can take place.
- (4) To ensure more stable budgeting by the Authority and the participating municipalities.
- (5) To assist with the orderly development of urban and rural planning by the member municipalities.
- (6) To assist in the integration of Authority action with that of other agencies to achieve the most effective and economical total conservation program for the Mississippi Valley.



SECTION 24

BASIS OF PLAN

The Conservation Plan is based on studies and analyses carried out by the Conservation Authorities Branch of the Department of Energy and Resources Management. Details of the studies are contained in Volumes I and II of the Mississippi Valley Conservation Report. Some of the more important criteria are as follows:

- (1) The Mississippi watershed is an area composed of independent municipalities, each to some degree dependent on the others, and all closely associated with the natural resources of the watershed.
- (2) Urban development and permanent rural non-farm development will be concentrated in that area of the watershed generally east of the line from the Mississippi River mouth to Carleton Place.
- (3) Demands for cottage sites and recreation opportunities will be most concentrated in the area generally west of Carleton Place.
- (4) The Authority's resource management objectives can be carried out successfully only if member municipalities co-operate by adopting land-use regulations such as subdivision control, zoning by-laws and Official Plans which are consistent with Authority policies.
- (5) The activities of the Authority will be closely co-ordinated with those of other resource agencies of the local, federal and provincial governments.
- (6) The multi-use principle will apply in the development of Authority projects.
- (7) The Authority will organize its activities in such a manner that as many persons as possible of the general public can participate actively.
- (8) The Authority will receive local municipal financial support sufficient to qualify the Authority for a 75 per cent provincial grant under The Conservation Authorities Act, 1968.





SECTION 25  
DEVELOPMENT POLICY

1. General Policies

The general policies governing all developments of the Mississippi Valley Conservation Authority are as follows:

(a) Management of all existing natural resources must be compatible with the needs and demands of the population and the growth and development of the municipalities.

(b) The Authority will co-ordinate its activities with other agencies affecting resources, such as the Departments of Lands and Forests, Agriculture and Food, Municipal Affairs, and Highways; and the District Health Units, Ontario Water Resources Commission and the National Capital Commission.

(c) The Authority will encourage local municipalities and planning boards to adopt land-use regulations, and will endeavour to have incorporated within these regulations, policies which are consistent with the resource management objectives of the Authority.

(d) The Authority will prepare and register fill and construction regulations under the provisions of Section 26 of The Conservation Authorities Act, 1968, and co-ordinate these with Official Plans and zoning by-laws. Top priority will be given to urban or urbanizing areas, and areas of intense cottage development.

(e) The Authority will encourage and participate actively in converting marginal and submarginal land to more productive uses, including recreation, with a view to improving the overall economy and resource management of the watershed.

(f) The principle of multiple-land-use will be recognized and particularly in areas of higher population densities.

(g) The preservation of the natural environment including areas of natural, scenic, biological and historic interest will be acknowledged in the Authority's program of resource management.

(h) In co-operation with other interested agencies, the Authority will endeavour to ensure adequate stream flows and the improvement of the quantity and quality of surface water supplies.

(i) The financial levy in any year to a member municipality shall not exceed 0.5 mills on the provincial equalized assessment, except where the municipalities concerned request a special project and are prepared to assume the Authority's share of the cost.

(j) Because of its limited financial base, initially, the Authority

will emphasize the acquisition of lands required for its various projects, and will defer or limit its expenditures on actual development.

(k) The Authority will establish advisory boards in order to enlist the skills and interests of qualified citizens as well as those of Authority members.

(l) The Authority will establish an active educational program in order to communicate to all residents, of all ages, in the watershed, an understanding of the Authority's aims, objectives, and technical and financial assistance programs. This will involve meetings, publications and displays of the technical, financial and integrative roles of the Authority in maintaining and enhancing those amenities which sustain a pleasant environment within which to live, work and play.

## 2. Water Development Policies

In the development of water management projects the Mississippi Valley Conservation Authority will adhere to the following specific policies:

### (a) Dams and Reservoirs

(i) Action will be taken, by acquisition or other means as soon as possible, to gain control of lands necessary for the future construction of dams and reservoirs.

(ii) The Authority will initiate a phased program of design and construction for those dam and reservoir sites recommended in this report and shown on Figure 5-1, and in addition will investigate other project sites as required.

(iii) Generally, water control projects will be designed for multiple-use including flood protection, maintenance of adequate flows and recreation facilities.

(iv) Dams and reservoirs shall be designed for multiple-use wherever practical and to give protection against at least flows of the magnitude of once-in-one-hundred years.

(v) Spillway capacities shall be designed to meet local conditions.

### (b) Channel Improvements and Diversions

(i) Where reservoir sites are not readily available, or their acquisition is not economically feasible, flood protection by the construction of channel improvements and diversions will be considered.

(ii) All channel improvements and diversions shall be engineered to withstand high flows and velocities without creating adverse downstream effects.



(iii) In advance of construction, necessary rights-of-way for channel improvements will be protected, by various means, from developments which would interfere with the eventual proper development of the projects.

(c) Land Use Regulations

(i) Action will be taken to restrict the use of flood-prone areas and valley slopes to such non-intensive uses as agriculture, parks and recreation, through Regulations pursuant to Section 26 of The Conservation Authorities Act, 1968, and through co-operation with municipalities in zoning and development control.

(ii) A systematic program of flood plain and stream valley land mapping will be initiated to provide information to municipalities and private owners on flood and erosion-vulnerable lands.

(d) Water Quality

(i) A program of periodic water sampling will be established to assist the Ontario Water Resources Commission in locating and controlling sources of water pollution.

3. Fish and Wildlife Development Policies

The Mississippi Valley Conservation Authority is keenly interested in establishing, where necessary, and maintaining an optimum population of fish, wildlife and plant communities, and to this end will pursue the following policies:

(a) Continuous liaison will be maintained with the Tweed and Kemptville District offices of the Department of Lands and Forests.

(b) Landowners will be advised and/or assisted in such improvements as the installation of Wood Duck nesting boxes.

(c) On Authority-owned lands and on privately or publicly-owned lands, such land management practices and studies will be encouraged, as will improve browsing conditions for deer.

(d) Action will be taken to acquire, whenever possible, small areas having rare species of fauna or flora of special interest to naturalists.

(e) Except in areas where there is a conflict of activities, Authority-owned lands will be made available for hunting during suitable periods.

(f) In co-operation with the Department of Lands and Forests efforts will be made to improve the "sportsman-landowner" relationships, in order to minimize the posting of land, thereby making available private lands for hunting and fishing.

#### 4. Recreational Development Policies

The Authority will embark on a phased program of establishing a network of trails, routes and conservation areas, as shown on Figure 21-3, and in doing so will adhere to the following policies:

- (a) All developments will be of a high quality, and will be developed with the assistance of professionals, such as landscape architects.
- (b) A Conservation Area Classification and Zoning System will be adopted and applied in the development of all Authority lands.
- (c) Liaison will be established and maintained with public agencies such as the Department of Lands and Forests.
- (d) Member municipalities will be encouraged to incorporate within Official Plans, sub-division approvals and zoning by-laws, provisions which will enhance the natural beauty and environment of the watershed.

#### 5. Land Use and Forestry Development Policies

Under the guidance of its Land Use and Forestry Advisory Board, and with the assistance of the District Offices of the Department of Lands and Forests and the Department of Agriculture and Food, the Authority will pursue the following policies to ensure the wise use of land and forest resources:

- (a) A phased program of acquisition of submarginal agricultural land will be established with the aim of acquiring approximately 500 acres per year.
- (b) Where the lands mentioned in (a) above are best suited for the single purpose of forest management, the purchasing will be concentrated in that area of the Authority generally west of the line from the river mouth to Carleton Place.
- (c) Purchases will be such that consolidated blocks of property are eventually created.
- (d) Lands having small ponds, stream shorelines and wet lands as major features will not be acquired solely for forest production, but will be developed for combined forestry, wildlife and other compatible uses.
- (e) In areas where land is held mainly by the Crown, competition with the province for purchase of privately owned lands will be avoided.
- (f) Liaison will be maintained with ARDA in order to enable the Authority to have lands unsuitable for agriculture, under the farm consolidation program, set aside for Authority purposes.

(g) Private land advisory and assistance programs will be set up for areas of potential intensive agricultural production to promote:

- (i) better drainage systems;
- (ii) erosion controls through proper cultivation practices, and the establishment of grassed waterways; and
- (iii) stream-bank stabilization and improvement through the establishment of vegetative cover and protection from live-stock.





SECTION 26  
DEVELOPMENT PRIORITIES

The following priorities have been established after due consideration of the background studies carried out by the Conservation Authorities Branch, the development policies of Section 25 and the financial capabilities of the Authority. The priorities cover a five-year period, but the projects have been selected within a broader, long-range program. The priorities will be adjusted from time to time as conditions warrant, and a complete review will be carried out after the first five years.

These priorities must be read in conjunction with the following maps:

- Fig. 5 - 1     Surface Water Resources
- Fig. 15 - 1    Erosion Conditions and Remedial Measures
- Fig. 21 - 1    Lands Suitable for Public Acquisition or Farm Consolidation
- Fig. 21 - 3    Proposed Conservation Areas and Recreation Routes

1.     General Programs

There are a number of recommendations within this report, which do not involve major expenditures, but which are, nevertheless, of major importance to the overall resource management objectives of the Mississippi Valley Conservation Authority.

Therefore, the Authority will take steps to have the following programs implemented immediately:

(a)     The establishment of advisory boards to propose and expedite the consideration of Authority programs. This will include an Environmental Management Advisory Board which will assess and advise upon the overall effect upon the environment of all proposed developments, including Authority projects, in the watershed.

(b)     The notification to the OWRC and other appropriate authorities, of the urgent need to remove pollution from the following sources:

- (i)       wastes from the knitting mill and laundromat in the Village of Lanark;
- (ii)      effluents in the storm drain off Hillier Street, Village of Lanark;
- (iii)     leak of raw sewage from the sewer main, Town of Almonte;

- (iv) the dumping of whey into watercourses by the Balderston Cheese Factory;
  - (v) leak of sewage into the Carp River from the sewage lagoon at the Glencairn subdivision;
  - (vi) the dumping of sawdust into the Clyde River at Hopetown and Lanark;
  - (vii) the municipal dump at Highway No. 7, north of Sharbot Lake;
  - (viii) municipal sewage treatment facilities at Carleton Place;
  - (ix) wastes discharged by the textile mill at the Town of Almonte;
  - (x) wash water discharges to the Mississippi River from the dairy products plant at Almonte; and
  - (xi) human wastes from outhouses built over the Clyde River at Lanark Village.
- (c) In co-operation with the Department of Lands and Forests, investigation, and if found feasible, the implementation of the following programs:
- (i) the stocking, with largemouth bass, of Samuel Lake;
  - (ii) the installation of gravel-filled spawning boxes in the creek draining Buckshot Lake;
  - (iii) the stocking of Barbers Lake with brook trout;
  - (iv) the stocking of Roberts Lake with brook or lake trout;
  - (v) active support for the circulation of angling questionnaires designed to provide information for effective fish management;
  - (vi) the enlargement and diversification of deer browse improvement plots, with examination of same in winter and spring to determine effectiveness; and
  - (vii) the establishment of liaison among agencies and private land owners, with the intent of securing agreement for fishing, hunting, motor-tobogganing and hiking trails on private land.
- (d) The adoption of a Conservation Areas Classification and Zoning Scheme as a tool for the planning, development and management of all Conservation Areas.



(e) The establishment of a working liaison with member municipalities, to review the adequacy of present land-use planning regulations as they may affect conservation policies and objectives; and the provision of assistance in formulating policies and land-use regulations consistent with Authority policy, particularly in flood-prone areas, areas of unusual natural beauty and lakeshores.

(f) The establishment of an active educational program in order to communicate to all residents, of all ages in the watershed, an understanding of the Authority's aims, objectives, and technical assistance programs.

## 2. Detailed Programs

The detailed projects and programs of the Authority for each of the first five years are set out below. They are classified as either Continuing or Specific, depending on the length of time required for completion. The notation in brackets refers to the dominant purpose of the program.

### YEAR 1

#### Continuing Programs

- (WATER)
- (1) The instituting of an expanding network of stream and precipitation gauging; including the recruitment of gauge readers, investigation of sites and establishment of stations.
  - (2) The establishment of a continuing program of flood plain and valley land mapping, resulting in fill and construction regulations covering these areas under the provisions of Section 26 of The Conservation Authorities Act, 1968. The priority of areas to be mapped and regulated is as follows:
    - (i) Kanata Area
      - the south-east corner of Huntley Township, from the Village of Carp to the Authority boundary.
      - lower half of March Township including all tributaries of the Carp River.
      - Hazeldean-Glencairn area.
      - Stittsville.
    - (ii) Carleton Place Area
      - Town of Carleton Place
      - upstream to Lake Park
      - downstream to Appleton.
    - (iii) Town of Almonte

- (iv) Village of Lanark
- (WATER, LAND) (v) Sharbot Lake village and surrounding area
- (WILDLIFE, WATER) (3) The establishment of a water sampling program in conjunction with the Ontario Water Resources Commission, concentrating on areas of permanent residential or industrial development and cottage communities.
- (WILDLIFE) (4) The establishment of a program to provide Wood Duck nesting boxes to private owners of land.
- (5) The instituting of a program of land acquisition in the highlands of Pakenham Township.
- (FORESTRY, WILDLIFE) (6) The initiation of a continuing program of acquisition of lands suitable for management as combined Forestry and Wildlife areas: Table 26-1 gives the priorities and a brief description of lands suitable for these purposes. Approximate locations are shown on Figure 21-1.
- (7) The establishment of a canoe route from Bon Echo and Mazinaw Lake to Fitzroy Harbour at the confluence of the Mississippi and Ottawa Rivers, following a phased program consisting of the following four components:
  - (i) river improvement by the clearing of log jams, weed cutting and removal, and cleaning up of unsightly logging chutes;
  - (ii) improvement and maintenance of existing portages and creation of new ones where necessary;
  - (iii) development of camp sites in conjunction with the Department of Lands and Forests;
  - (iv) preparation of a complete guide book to the canoe route to provide detailed mapping of the river, exact locations of portages, camp sites, starting points and suppliers of provisions along the route.
- (RECREATION)
- (RECREATION) (8) Proceedings toward acquisition of access points to the Mississippi River and lakes in the watershed for locating public boat launching and parking facilities. This program will complement that of the Department of Lands and Forests.
- (9) The initiation of an expanding network of hiking trails as combined-use corridors and the publishing of guide books. The following priorities will be followed:
  - (i) the Mississippi River Trail, following where possible the Mississippi Canoe Route and utilizing common camp grounds;

- (ii) a trail connecting with the trails of the Rideau Valley Conservation Authority and running from Attewell Lake to the Sharbot Lake — Calabogie Railroad right-of-way at Sharbot Lake;
  - (iii) the development and use of the abandoned railroad right-of-way from Sharbot Lake to Flower Station or Mile Lake as a limited access trail under an agreement negotiated with the Canadian National Railways. This "corridor" is intended to support activities such as hiking, walking, cross-country skiing, motor-tobogganing, horseback riding, and access to extensive natural areas in the north part of the watershed.
- (RECREATION)
- (10) The laying out of scenic drives and scenic "circle" routes, and compiling of information for eventual publication of a route guide book.
- (11) Initial acquisition of key parcels in the Eagle Hills area, in a co-operative program with the Department of Lands and Forests.
- (LAND)
- (12) The establishment of a program of grassed waterways construction using a combination of the following methods:
  - (i) demonstration grassed waterways established and maintained by the Authority in several areas; and
  - (ii) provision of technical and financial assistance to private landowners with priority being given to lands in the area of Cody Creek and north of the village of Kinburn.
- (LAND)
- (13) Initiation of a program of technical and financial assistance to private owners of erosion-prone lands along the banks of the Mississippi River, for planting of suitable shrubs in order to prevent further deterioration of the river banks.
- (LAND)

#### Specific Programs

- (WATER, WILDLIFE, RECREATION) (1) Construction of weirs on Bennet, Joe and Marble Lakes, with additional stocking of Bennett Lake with walleye eggs.
- (WATER) (2) Pre-engineering study of the Carp River Channel improvement at the village of Carp.
- (WILDLIFE) (3) Acquisition and improvement by blasting of Cattails of part of the Barr Lake area for wildfowl habitat.
- (RECREATION) (4) Acquisition and development of the large island in Kashwakamak Lake as a camp site and picnic area on the canoe route.
- (5) Investigation and initial acquisitions and development of the following project areas, with a view to completing the acquisitions within a five-year period:



- |              |       |  |
|--------------|-------|--|
|              | (i)   | Peterson Creek Bridge area on the right-of-way of the abandoned railway;             |
|              | (ii)  | the area on the east bank of the Mississippi River north of the Pakenham Bridge; and |
| (RECREATION) | (iii) | the area on the east side of the Mississippi River opposite the Appleton Mill.       |

## YEAR 2

### Continuing Programs

- |                       |     |  |
|-----------------------|-----|--|
| (WATER)               | (1) | Establishment of a flood warning system.   |
| (WATER)               | (2) | Establishment of a Committee to co-ordinate the operation of the various dams under different jurisdictions within Authority boundaries.   |
| (WILDLIFE)            | (3) | Commencement in co-operation with the Department of Lands and Forests of the collection of depth-temperature data for all lakes for which depth contours are available so that lake trout, brook trout or bass can be introduced where feasible. |
| (GENERAL APPLICATION) | (4) | Further implementation of all continuing programs of Year 1.   |

### Specific Programs

- |            |     |   |
|------------|-----|---|
| (WATER)    | (1) | Repair of dam on the Clyde River at Lanark Village.   |
| (WATER)    | (2) | Pre-engineering study of the Kashwakamak Lake Diversion.  |
| (WATER)    | (3) | Through the Dam Co-ordination Committee and with the co-operation of the appropriate agencies and companies, encouragement of the restoration and repair of dams at the outlets of Lakes Mississippi and Mazinaw.   |
| (WATER)    | (4) | Construction of channel improvements on the Carp River at the village of Carp.  |
| (WILDLIFE) | (5) | Removal of stumps from part of Taylor Lake to provide better access to good fishing areas.  |
|            | (6) | Acquisition of lands and establishment of a managed hunting area on Lower Mud Lake and the lower part of the Fall River, with the management to be in co-operation with the Department of Lands and Forests. Part of the area is to be maintained as a wildfowl refuge. |

### YEAR 3

#### Continuing Programs

- |                          |   |
|--------------------------|---|
| (WATER,<br>WILDLIFE)     | (1) Establishment of a conservation pond program to provide technical and financial assistance for pond construction. |
| (GENERAL<br>APPLICATION) | (2) Further implementation of all continuing programs of Year 1 and Year 2.   |

#### Specific Programs

- |                           |  |
|---------------------------|--|
| (WATER)                   | (1) Commencement of construction of Kashwakamak Lake diversion on a two-year basis.                        |
| (WILDLIFE,<br>RECREATION) | (2) Widening of channel between Taylor and Clayton Lakes.  |
| (WILDLIFE)                | (3) Construction of weir on Manion Corners Marsh to improve area for wildfowl (Con. IV, Huntley Township). |

### YEAR 4

#### Continuing Programs

- |                          |   |
|--------------------------|---|
| (GENERAL<br>APPLICATION) | (1) Further implementation of <u>all</u> continuing programs of previous years. |
|--------------------------|---|

#### Specific Programs

- |                          |  |
|--------------------------|--|
| (WATER)                  | (1) Completion of construction of Kashwakamak Lake diversion.  |
| (GENERAL<br>APPLICATION) | (2) Evaluation of progress on and effectiveness of all Authority programs, with a view to formulating a revised program for the next five-year period. |

### YEAR 5

#### Continuing Programs

- |                          |  |
|--------------------------|--|
| (WILDLIFE)               | (1) In co-operation with the Department of Lands and Forests, commencement of acquisition of the Wolves Grove area for deer and wildlife management. |
| (GENERAL<br>APPLICATION) | (2) Further implementation of all continuing programs of previous years.   |

## Specific Programs

(GENERAL  
APPLICATION)

(1) Formulation and adoption of a revised program for the next five-year planning period, covering the recommendations of the Conservation Report, and any other matters that may have come to light in the first five years of the Authority's operations.

TABLE 26-1

**PURCHASE PRIORITIES FOR COMBINED  
FOREST AND WILDLIFE MANAGEMENT AREAS**

Priority	Township	Location	Attributes	Area (Approx.) Acres
1	Lavant	Peterson Creek Nicholson Lake	a. stream area b. accessible c. close to recommended recreation area	380
2	Clarendon	North-easterly corner of the Township	a. small lake b. small stream c. accessible	850
3	March	Mud Lake area	a. small lake b. accessible c. close to Ottawa River	640
4	Lanark	Gunn Creek - Anderson Lake	a. small lake and creek b. accessible	600
5	Clarendon	Minktrack Lake	a. lakeshore b. stream shoreline c. accessible d. proximity to major lake chain	400
6	Lanark	Samuel Lake	a. shoreline b. accessible	650 to 700
7	South Canonto	South-easterly corner of Township	a. major stream b. accessible c. close to major lakes	600 to 650
8	North Sherbrooke South Sherbrooke	Con. IV  Cons. XI, XII area on bound- ary between Townships	a. major stream, shore b. some reasonable open land for reforestation c. accessible	1,100 +
9	Darling	Madden Lake area	a. portion of small lake	200

Table 26-1 continued on page 153



Table 26-1 continued from page 152

Priority	Township	Location	Attributes	Area (Approx.) Acres
10	Clarendon	Con. X, Con. IX off Hwy. 506	a. some clear land b. small lake c. accessible	500 to 600
11	Lavant	Joe Lake area	a. good shorelines b. accessible	400
12	Darling	Con. VI in southern part of Township	a. small streams b. accessible	200
13	Clarendon	Adock Lake area	a. small lake or pond b. close to major lake	200 to 300



SECTION 27  
IMPLEMENTATION

This Plan will be implemented by the Mississippi Valley Conservation Authority in conjunction with the member municipalities and private or government agencies, whose activities will have an effect on conservation measures.

Specifically this Conservation Plan will be implemented by the following:

- (1) successive five-year budgetary programs reflecting the current grant structures, the financial capabilities of the member municipalities and the Development Priorities outlined in Section 26;
- (2) the integration, wherever possible, of the policies and programs of this Plan with existing and future municipal and regional Official Plans, restricted area (zoning) by-laws and development programs;
- (3) co-operative action with public or government agencies such as ARDA, the Department of Lands and Forests and OWRC;
- (4) a program of public relations and conservation education; and
- (5) Project Plans conforming to this Plan, but outlining in detail specific projects to be undertaken by the Authority and co-operating agencies.













